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1963

Journal

of the

Royal Naval Medical Service

Journal

of the

Royal Naval Medical Service

VOL. XLIX

1963

EDITED BY
THE STAFF OF THE ROYAL NAVAL MEDICAL SCHOOL
ALVERSTOKE, HAMPSHIRE

No 1 Winter 1963 Vol XLIX

Journal
of the
Royal Naval Medical Service

PUBLISHED QUARTERLY

(The Editor does not accept responsibility for the opinions expressed in this Journal)

PAGE

EDITORIAL 1

ARTICLES

Ageing in the Royal Navy—Part II By SURGEON LIEUTENANT COMMANDER W B WRIGHT MB ChB MRCP (Edin) RN (Retired) 2

Sea sickness By SURGEON CAPTAIN S MILES MD ChB MSc DTM & H RN and SURGEON LIEUTENANT J J BRAND MB BS MRCS LRCP RN 14

Some Considerations Concerning the Effects on Hearing of the Noise of Small arms By SURGEON LIEUTENANT COMMANDER R R A CILLS MB BCh DLO RN 18

Effect of Jet Aircraft Noise on Hearing By J J KNIGHT, Ph D 23

Controlled Clinical Trial with Prothipendyl Hydrochloride ('Tolnate') as a Premedication in Anesthesia By SURGEON COMMANDER A O CONNOR MB BS MRCS LRCP FFARCS RN and SURGEON LIEUTENANT I M MACINTYRE MB ChB DA RN 28

Relationship Between Morale and Health in a Ship's Company By SURGEON LIEUTENANT J A SAVIN MB BCh RN 33

The Treatment of Depression with Tranyleypromine ('Parnate') By SURGEON COMMANDER W CULLEN MD ChB RN 37

CLINICAL NOTES AND CASES

Eosinophilic Granuloma By SURGEON CAPTAIN (D) A MACDONALD WATSON *OBE* LDS RN and SURGEON LIEUTENANT-COMMANDER (D) J D SILVERS FDS, RN 44

Accidental Poisoning with Carbon Tetrachloride By SURGEON COMMANDER J M CLIFF MA MB BChir, MRCP (Lond), MRCS, DPM RN 47

An Unusual Problem of Contact Lenses By SURGEON COMMANDER P D A DURHAM MB BS, MRCS LRCP DCH DO RN 54

REVIEWS 55

NEWS OF THE SERVICE

Obituaries Higher Qualifications New Entries Short Service Commissions converted to Five Years Promotions Transfers to the Permanent Service Retirements Termination of Short Service Commissions, Wardmasters, Queen Alexandra's Royal Naval Nursing Service Royal Naval Reserve Appointment Retired Royal Naval Medical Officer 61

ADMIRALTY FLEET ORDERS 63

NOTICE Inside Back Cover

EDITED BY
THE STAFF OF THE ROYAL NAVAL MEDICAL SCHOOL,
ALVERSTOKE, HANTS

Editorial

THE EDITOR is frequently receiving requests for back numbers of the JOURNAL and stocks held are becoming very limited. Any readers who have back numbers which they would be willing to let us have would be doing us a very great service. In particular the following numbers are urgently required: Vol. 47 No. 3 (Summer 1961) and Vol. 48 No. 1 (Winter 1962).

In the last week of November a further symposium on medical problems in the Royal Navy was held jointly by the Royal Naval Medical School and the Royal Naval Air Medical School at the latter establishment at Seafield Park. This will be fully reported in the next issue when a selection of papers will be reproduced.

It is encouraging to note that in recent years both the standard and quantity of articles submitted for publication has improved and increased. This has unfortunately the inevitable result that certain of these articles must be held over for subsequent issues and authors are therefore asked to accept this delay with the assurance that this does not imply that the standard may be less than those appearing in the current issue. It is dependent principally upon the size of the article and the subject matter to give each issue as balanced a contents as possible. The size of the JOURNAL is entirely limited by financial resources and although over the past year there have been considerably more new subscriptions than those lost by retirements and other causes a further increase in the numbers of subscribers would indeed be most welcome. Readers will be doing themselves, as well as the JOURNAL a service if they can encourage more of their friends and colleagues to take the JOURNAL OF THE ROYAL NAVAL MEDICAL SERVICE.

Articles

AGEING IN THE ROYAL NAVY

By Surgeon Lieutenant-Commander W. B. WRIGHT, R.N.

PART II—CHAPTER II

Material and Methods

"Nature always hangs out a little flag which when seen and understood, points to the diagnosis" (J. B. de Lee)

THE basic principle of an investigation of this kind is fairly straightforward. Since an impression of ageing is an intangible concept inaccessible to measurement, some reliable index of senescence other than age in years must be found. This index must then be applied to ratings of the Royal Navy and then used for comparison with the general public age for age. At the same time, any constantly occurring feature which might give a false impression of ageing should be watched for and noted. The difficulty here arises in the selection of an adequate ageing index. Although there are many components of the human organism which change their qualities with age, no one criterion is adequate as a measure of the whole process because of the wide individual variability of each and the difficulty in establishing any direct relationship between any one change and the rate of ageing of the organism as a whole (Davis, 1954). Here it must be remembered that since the passage of time *per se* is not the sole factor in ageing, which varies with the species, it cannot be certain that all systems of the body age at the same pace.

The inadequacy of any one criterion leads one on to consider the prospects of using a *composite* of signs as such an index. The essential basis of good clinical diagnosis is, after all, the accumulation of signs and symptoms, which separately mean very little, but which together point unmistakably to the source of the complaint (e.g. as in thyrotoxicosis (Crooks, 1959)).

A number of clinical signs associated with ageing might be selected according to their convenience and potential reliability.

If, in comparing two individuals, one showed all the signs and the other showed none, it would be reasonable to assume that the latter was a younger man. If these men were both the same age in years, and the former looked older than the latter, these signs would provide powerful confirmatory evidence that he was prematurely aged in comparison with the latter.

In the same way, if, in the examination of two groups of people, one showed a higher incidence of several such signs, it would be reasonable to say that an impression of premature ageing in that group was justifiable to some extent. Such group testing, using several physical signs together, would cut out the unreliability of individual tests. For example, if one of these signs bore no direct relationship to ageing, this

the sign would not vitiate the accuracy of the result as a whole and it would so stand out from its fellows that it would be easily recognizable for exclusion from further study Preferably the signs selected would have to be as unrelated to each other as possible so that each would carry its own weight in the accumulated evidence Ideally each should be in a different system and involve a different mechanism They should be easy to elicit and measurable or at least subject to as little observer error as possible

In an attempt to find the appropriate physical signs I decided to visit Pembroke House Gillingham which is a home for aged ex-naval pensioners I examined these men for reliable signs Without exception they were grey- or white headed Arcus senilis was evident in most and their range of visual accommodation was minimal Many had developing cataract and some were more or less blind Parkinsonism was notable and most had senile tremor They all had some impairment of hearing I found Campbell de Morgan's spots in everyone I examined Most had nocturnia, many had precipitency and some had incontinence There was a good deal of chronic bronchitis and wheezy chest Exercise tolerance was generally poor There were a few cases of frank diabetes mellitus These were the facts I found most readily elicitable

I selected the following

(1) *Grey Hair* It is evident at a glance whether or not a man is grey headed and according to Barahal (1940) "In history fable fiction and song, it has become synonymous with old age wisdom and reverence"

Behanan (1952) states that "normal greying begins at 35 or thereabouts with a group of non pigmented hair in the temporal regions which increase normally It is possible that after these areas have whitened the rest of the scalp may be spared or several areas may become white simultaneously The loss of pigment is due to the failure or exhaustion of the pigment-producing cells in the hair root Premature greying of hair is a well recognized phenomenon and many causes have been cited for it including heredity emotional strain endocrine disturbance chronic disease and deficiency of certain ingredients of the normal diet (Barahal 1940). (Frost 1948) According to McCarthy (1926) premature greying begins at a much earlier age and affects the whole head rather than beginning at the temples I decided that it would be practicable to find out at what age definite greying at the temples was evident on average in a group It is appreciated that had I been dealing with women the investigation would be rendered valueless by the prevalence of hair-dyeing among them I was unable in spite of many references to premature greying in the literature to find any statistical survey of the incidence of greying of hair with age, oddly enough This made the present project seem even more interesting

(2) *Arcus Senilis* Arcus is a peripheral corneal opacity which begins in the upper and lower poles of the cornea (where it is usually shielded by the eyelids) and gradually extends round the circumference sparing the rim It consists of deposited fat, and gives the histochemical and solubility features of cholesterol phospholipid and neutral fat (Cogan and Kuwabara 1959) It is derived from the blood, and though it results in a slight loss of corneal sensitivity (Forstus 1958) it is not apparently dependent on any intrinsic corneal degeneration (Cogan 1959) It occurs occa-

sionally as 'juvenile arcus' in quite young people, when it is associated with hypocholesterolaemia (Forstus 1954). When it appears in the ageing subject there is no association, although it has been linked with arteriosclerosis (particularly in negroes) (Scott 1931).

Heinmen (1921) and Fischer (1941) showed that its appearance increased steadily with ageing. I selected this as a suitable ageing concomitant for study because of its simplicity of elicitation without much observer error. The incidence of juvenile arcus is unlikely to be great enough to affect the average age of emergence of the sign.

(3) *Campbell de Morgan's Spots.* To quote Dore (1945) Campbell de Morgan's spots "are small red vascular lesions occurring after middle age and mostly on the trunk which do not disappear on pressure and have been thought but on insufficient evidence to presage the onset of cancer". There is no definite evidence that Campbell de Morgan (1872) thought his spots indicated malignant disease. Murison (1947) exploded the idea that they were in any way related to cancer by their massive incidence in a survey of more than 1,300 individuals. Commenting on these findings, Weber (1947) stated, "I believe that ruby spots will come to be regarded as the most conspicuous non-malignant mutations of somatic cells". Murison showed a direct relationship between increasing age and rising incidence of these spots, at least up to 70. Thus in adolescence only 5 per cent had spots; in old age 75 per cent had them. The results took the form of a smooth rising curve.

From the above observations it seemed that Campbell de Morgan's spots would be ideally suitable for another parameter in this study. They are easily seen and identified. The bright ruby colour of the lesions distinguishes even the smallest from other spots.

(4) *Range of Visual Accommodation.* That there is a steady reduction in the range of visual accommodation with advancing years was first shown by Donders (1864) and confirmed and depicted in a scattergram covering 4,000 individuals by Duane (1906). This is due to senescence of the lens and represents essentially the accumulation of larger and larger portions of inert desiccated tissue in its centre. The young, growing portion of the lens is soft and deformable while the central, older portion is rigid. Thus the cortex alone takes part in the act of accommodation and as the cortex occupies progressively a smaller fraction of the whole volume of the lens, the amplitude of accommodation decreases. This decrease begins at birth and proceeds steadily as age progresses (Friedenwald, 1952). Duane (1906) showed that there were quite wide individual differences in visual accommodation in any one age group, and Bernstein (1932) produced evidence which suggested that those whose accommodation was better than the average for their years were liable to live longer. This remarkable idea has not been confirmed by anyone so far (Friedenwald 1952).

For practical purposes range of accommodation in dioptres can readily be calculated by finding the near point of vision, using Jaeger 1 type and excluding those persons from the investigation who have errors of refraction such as myopia or astigmatism. Dandos (1864) used small print for the test point in this way and

though Duane (1906) criticized this, his results were not sufficiently different to warrant the more elaborate technique he adopted for an investigation of the present type which involved analysing groups rather than individuals and aimed at showing the main trend only Since establishing the near point in centimetres is the work of only a few moments it was felt that such an investigation was a justifiable addition to the group Involving as it did a definite measurement it was hoped that a fairly clear answer might be obtainable in this respect which would be easily comparable with existing studies

(5) *Nocturia* Shock (1952) (1956) has shown that with increasing age there is a steady reduction in renal function which is apparently closely related to degeneration of vascular pathways of supply On the other hand, Oliver (1952) points out that even in old age there is still a good maintenance of the concentrating and excretive powers of the kidney and "depreciation of kidney function is not a major difficulty for other systems such as heart and brain similarly involved by vascular change fail more rapidly and more disastrously" However this may be most old men are unable to pass the night without emptying the bladder Perhaps they sleep much more lightly and respond more readily to the stimulus of accumulating urine Perhaps the bladder becomes more irritable in relation to prostatic changes which begin at about 40 (Moore 1952) At any rate the symptom is part and parcel of an old man's heritage It occurred to me that the average age of onset of nocturia if it occurred in the group I was studying would provide another simple and relevant index with which to compare ratings with other people None of the other clinical features of ageing seemed suitable for use in an appraisal of a large group of people Impairment of hearing is a possible subject for use in group comparison According to Covell (1952) a high-tone hearing loss which increases with each decade of life, for most individuals is characteristic of deafness in the ageing For measurement of this sensory function however an audiometer is essential and the test is time consuming What might therefore have made a good criterion of ageing for comparison of groups had to be rejected For similar reasons respiratory function tests were impracticable

Welford (1958) in his book made it fairly obvious that there was no very simple or conclusive test of mental function which was not prohibitively time-consuming if used with others in community sampling of the type envisaged

Mean systolic blood pressure appears to rise fairly steadily with age (Bible *et al*., 1949) (Lansdowne *et al* 1955), but since random assessment is so variable the mean of about six readings is desirable for statistical purposes (Bradford Hill 1960)

Shock (1955) and Yiengst (1955) demonstrated that basal metabolic rate and CO_2 elimination dwindled with the years, but here again the necessary technique is over cumbersome for a pilot clinical study

There appears to be no simple laboratory test which might have served as an ageing index The blood picture, blood sugar and acid-base equilibrium, for example do not change significantly (Shock 1956), neither is there any consistent alteration in the balance of serum lipids (Watkin *et al* 1954) Even the excretion of urinary steroids does not change as predictably as might be expected (Pineus, 1954)

The only readily ascertainable change which appears to occur with any consistency is the phosphatase levels of the blood which rise with ageing until about 60, then decline (Sewell 1960). The gradation of difference is however very slight and there is much random scatter. Furthermore, the results of one laboratory might differ sufficiently from another to be accountable for any difference that might emerge between two groups of people, separately assessed. Since it would be difficult to perform blood tests on any large group of ratings under study and impossible to organize a similar large scale testing of civilians through the same naval laboratory, the test could not be adopted for the present investigation. It is evident, however, that should a larger and more detailed study of the ageing characteristics of ratings as a group be indicated, for example, as a result of the present enquiry, some of the signs mentioned above could indeed be called into play without insuperable difficulty. It is probable that in this way the mass of accumulated evidence collected would furnish a decisive answer.

(6) *Costal Cartilage Calcification.* Apart from the above lines of approach, advantage was taken of the fact that ratings are X rayed annually as part of the naval anti tuberculosis campaign. Calcification of the costal cartilages has been regarded as due to a wide variety of causes (Fischer, 1955) and it has even been postulated that this may be an adaptive phenomenon due to man's assumption of the erect posture. King (1939) who proposed this theory did not advance very good reasons for it, however, and the central theme of his article—that calcification is not perichondral but central—was exploded by Fischer (1955) who showed that perichondral calcification was by far the commonest process in males, though the position is very different in women. It is probable that calcification of the first costo-chondral junction has indeed an etiology unrelated to degenerative changes in the organism since, as both authors have pointed out, this change occurs very early and consistently. Costal cartilage calcification elsewhere, however, appears with successively greater frequency throughout adult life. Just as very few young people have widespread calcification of the rib cage cartilage, so very few old men are without it. Whether or not there is a direct linkage with senescent changes therefore the sign is a reliable concomitant of the ageing process and might therefore be applied to a group as an ageing index for comparison purposes.

(7) *Longevity and the Incidence of Ageing Diseases.* When all is said and done the ultimate index of the rate of ageing of any species is its average life expectancy. No matter what results one might obtain from the six criteria enumerated above it would be difficult to draw any conclusions without some idea of the mean life span of naval ratings. Indeed the investigation might be unjustified if information were not available which at least hinted at some difference between ratings and the general public in this respect. It therefore seemed fitting to turn to the Registrar General's Decennial Supplement (1951) and review the occupational mortality of ex naval ratings from degenerative disease. If ratings actually did suffer from more rapid ageing, with all its associated degenerations and died younger of senility then their standard mortality rate (20-64) for all causes and with particular respect to diseases associated with old age, would be much higher than the average. Such indeed proved to be the case. Of the 425 occupational groups Royal

Naval other ranks—retired—showed the *highest of all S M R.s* (20-64) for the following causes of death

(a) All causes
(b) Tuberculosis respiratory
(c) All malignant neoplasms
(d) Malignant neoplasm of stomach
(e) Malignant neoplasm of lung and bronchus
(f) Vascular lesions of the nervous system
(g) Coronary disease and other myocardial degeneration
(h) Pneumonia

It is noteworthy that apart from tuberculosis all the diseases mentioned are those commonly associated with senescence These published figures seemed to provide astonishing evidence in favour of these being a definite occupational hazard in naval life in relation to subsequent degeneration

In the commentary on these figures, however it was pointed out that both the population and the death figures (from which S M R is deduced) were particularly liable to error among ex-servicemen because of false certification albeit unwitting Retired servicemen often take up a further occupation and consequently at census because of the need for statement of industry may record their occupation at that time When registering a death informants may quite naturally give the deceased's occupation as retired serviceman thus upsetting the relationship between numerator and denominator necessary for correct calculation of death rates On the other hand the exact opposite might easily occur and bias the calculation in the other direction How far this sort of error influenced the figures was unknown and the commentary concluded, "It cannot be emphasized too strongly that should any analysis be made very great care and a considerable knowledge of the factors involved will be necessary before any firm conclusions can be drawn It is perhaps worth observing that however spurious the other items might be pulmonary tuberculosis has undoubtedly been a considerable naval problem in the past and consequently a high S M R in relation to this disease might have been expected This was the only disease not normally encountered as a complication of old age in which ex-naval ratings led the field It might have been thought that if the whole phenomenon were due to spurious counting then other non degenerative diseases would have appeared in the published results apart from this one It is also interesting to note that the naval figures were not only higher than the population as a whole but also higher than those of pensioners of the other services

Further work on the life expectancy of ex-naval ratings had hitherto not been done and, if only to refute the implications of such high mortality figures was obviously called for It transpired that the collection of more accurate figures proved much easier than might have been expected

For the past 50 years at least conditions of naval service have been such that the average naval rating's career is as follows His pensionable years begin at the age of 18 In order to qualify for maximum permanent engagement pension he must fulfil 22 years' service which means that his service commitment is over at the age of 40 He may only serve longer than this if he is medically and executively acceptable for a

further 5 years' [illegible] —the so called "fifth five" Although ratings normally begin their [illegible] at a later age and a few 'sign on' for extra service the vast majority retire on pension at 40 years of age and these men constitute almost the entire body of naval pensioners Their records are naturally all supervised by a department of Navy accounts so that the number of pensioners who had a full career in the Navy could be ascertained at any time

When a pensioner dies it is obligatory that a copy of his death certificate be sent to the accounts department which has supervised the payment of his pension for the purpose of closing the records His documents are not filed away until this information has been included they are then filed in alphabetical order and by the year of death It follows therefore that the death rate of naval pensioners can be obtained for any year except the current one (which cannot be a complete file) and the ages at death collected from the death certificates Bearing in mind the fact that the death rate per annum and the census of living population at any one time are the figures used by the Registrar General to obtain general life expectancy it becomes evident that much more exact information about ratings' life expectancy could be obtained readily with the same type of material

I decided that an investigation along these lines would be an indispensable part of the present study though in contrast to the other indices mentioned above this research would concern itself not with the present generation of ratings but with those of a generation or two before Any extensive study of the literature makes one aware that ageing itself is little understood It is obvious that no one criterion can be named which will indicate the level of degeneracy of the ageing body (Kountz 1952) But it seemed possible that if the selected concomitants of ageing mentioned above were taken together and particularly if they were applied to a group, rather than an individual a reasonable index of ageing might indeed be obtained These various signs certainly arise independently of each other, it may be noted thus

(1) Grey hair implies derangement of the melanin producing mechanism at the hair root

(2) Arcus senilis is the laying down of fat in the cornea

(3) Range of accommodation falls with desiccation of the lens

(4) Campbell de Morgan's spots mean non malignant metaplasia of epithelial cells

(5) Noctiuria is related to increased wakefulness or bladder irritability

(6) Costal cartilage calcification begins with the deposition of calcium salts

Since their mechanisms cannot apparently be inter-related, these indices have as their only common feature their increasing incidence in ageing subjects Only two alternative explanations for them seem reasonable

(a) They may represent the effect of the passage of time on the type of tissue concerned without being related to the life expectancy of the individual Thus, any of these signs might be like the rings of the trunk of a tree which appear with the passage of each year, and might well be regarded as a sign of ageing, though they bear no relation whatsoever to the life expectancy of the tree and are merely milestones of the past

(b) They may be subject or responsive to those intrinsic or extrinsic influences which lend to senile degenerative changes throughout the systems of the body and thus may be ns charneteristic of the species (or group?) as any othor senescent change

Perhaps it is impossible to distinguish for certain which category any of these signs belongs to yet, but the probability is that the second explination is more likely and that like the horse s teeth, some implications might be drawn from them If any one of these signs did belong to the hrst gronp (i e was related moro to the passage of time than the degeneration of the species) theu, like the rings of the tree-trunk it wonld not vary much between species bnt purely with tho age of the individnal If for example, hair went grey at a certain age irrespective of its owner and a rat went grey at three years it wonld seem reasonable to expect hnman hair to go grey after roughly, if not precisely, the same passage of years irrespective of the enormous difference in life expectancy between the two species In this (rather extreme) instance the opposite is, of conrse, found—namely that tho greying of hair is much more closely concerned with senescence than with time

There wonld be some hope, therefore of some conclusive resnlt relevant to ageing from tho investigation covering all the above points—certainly were one fortnnate enough to find that they all agreed in their implications

Methods

The nnderlying design of the ensning investigation was to examine at rnndom n fairly large number of ratings on nctive service gronped according to their nges, and find the age incidence of the six clinical signs listed above among them The ' second leg ' of the exercise would be to compare these incidences with civilian records already in existence or personally compiled Examination of pensioners records wonld be nndertaken as a separate investigation

It was at once apparent that there was no convenient method of obtaining simultaneous radiological nnd clinical information in the same individnals and mass X ray films had to be reviewed separately

Although the results which wonld emerge were completely unknown it seemed advisable to gather at the same time some points of personal history relative to the individuality of naval life along the lines discussed earlier Thus the following information was collected from each rating

(1) Branch

(2) Height

(3) Weight

(4) Total Service

(5) Sea-going Service

(6) Tropical Service

(7) Smoking history (see Fignre 1, Vol 46, No 4 Page 203)

(8) Whether or not the midday ' tot " of rnm was habitnally taken

(9) Marital status

Clinical Study

Clinically it seemed pointless to interrogate and examine ratings under the age of 25 since common experience made it evident that none of the signs would be present under this age

With the assistance of the executive officer all available ratings over the age of 25 were examined in groups of about 20 at a time working steadily through the different branches These examination sessions were carried out at the end of the lunch hour and since each rating was detained only 4 to 5 minutes no marked disturbance of service routine was occasioned

Clinical findings were charted according to the following routine

(1) Each rating was first told that he was taking part in a routine health study

(2) The appropriate questions relative to personal history were put to each rating and noted opposite his name and branch (these findings being filed according to age in years)

(3) The patient was asked casually whether he had to get up more than once at night to pass water as a rule This question was meant to imply that there would be nothing abnormal about having to rise once at night for this purpose Thus it was hoped to reassure those subject to nocturia sufficiently to make them divulge the symptom without confusing the issue in any way among the others. As Welford found (1958) older people will go to great lengths to refute any implication of weakness due to ageing in surveys of this kind

(4) Distant vision was tested on a Snellen's chart If binocular vision was 6/6 in a good light, he proceeded with the rest of the test which was carried out as follows The patient was sat in an upright chair A 100 watt lamp was positioned to shine forward over his left shoulder A standard Jaeger reading card was produced The patient was asked to read aloud the smallest print (J 1) as soon as it came into focus I began with the card too near to read and standing behind the patient drew it forward from the eyes with the left hand at the same time measuring its distance from the anterior surface of the eyes with a centimetre rule held in the right hand When the patient began reading the print it was advanced again towards the eyes until the reading stopped, then drawn back again until he recommenced reading The average of the two latter near points was taken as that characteristic of the patient Subjects with inadequate acuity astigmatism or myopia were excluded from the near point test

It was thought that the above method did not differ so greatly from those described by Donders (1864) and Duane (1906) as to produce widely different results in a large enough group

(5) As the above test was being performed a decision was made about the greyheadedness of the individual as follows

(a)	+	Greying at the temples obvious at a glance
(b)	+	Anything between (a) and (c)
(c)	+ +	A whole head of grey or white hair

(6) After the eye-testing as described in (4) corneal examination was made with straight and lateral flashlight illumination with the eyes raised and lowered (Friedman and Rosenman 1959) Particular note was made of the upper and

lower dental poles where arcus usually begins (Forsius, 1954). If arcus was not obviously present a negative result was marked.

(7) The subjects were told to strip to the waist for the examination and presented themselves in this condition. During a brief auscultation of the precordium a concentrated search of the anterior trunk from clavicle to pubis was made for Campbell de Morgan's spots. This was the area examined in the large study of Munson (1947).

Controls

It is not so easy for a service medical officer to gain access to any large unselected group of civilians for the purpose of any extensive clinical study, and it was realized from the onset that this might be relatively incomplete.

Fields of exploration were:

(1) *Dockyard Civilians.* At first sight this would seem to be an ideal field for study because the social status of dockyard workers is not very different from that of ratings. Their work, being mainly connected with shipping, bears a close similarity to that of their service counterparts, but their way of life is as different as that of any other civilian, except perhaps for a slightly greater chance of living abroad. However, there were disadvantages attached to examination of these men. Firstly, one cannot take random collections of dockyard workers and call them in for physical examination without getting their individual consent and arousing the protective curiosity of their union officials. A health survey of this kind can easily be misconstrued as an underhand analysis of efficiency, even if an attempt were made to explain the point of the exercise. To circumvent this, I undertook to carry out all the routine examinations of workers which were called for by the nature of their work (e.g. shot-blasters, lead and asbestos workers), and to obtain as much of the details required for my own research as possible at the same time. I was able to collect only the following information in this way, however:

(a) Occupation
(b) Tobacco consumption } see Vol. 48, No. 4, pages 202 and 203
(c) Alcohol consumption }
(d) Incidence of arcus senilis } Ascertained according to the criterion already settled
(e) Incidence of grey hair
(f) Incidence of Campbell de Morgan's spots

Another difficulty encountered was the fact that very many dockyard civilians were much older than the service groups with which I would have to deal and therefore were unsuitable for comparison. Many too were ex-ratings who had gravitated to unskilled or semi-skilled dockyard employment at the end of their service. Thus many who were examined had to be rejected and the ultimate field of results was poor.

(2) *Local Hospital In-patients.* The members of the staffs of various local hospitals allowed me free access to their wards for the sake of collecting material. It seemed inadvisable to use patients of the medical wards, however, since chronic illness is a well-known cause of a prematurely aged appearance, particularly those conditions which lead to wasting or low-grade anoxia and, incidentally, are liable to lead to admission to hospital (Koutz, 1952). Only patients admitted to surgical wards for

conditions of [illegible] acute transient nature were considered [illegible]. Unfortunately a very large proportion of traumatic lesions (e.g. motor-cycle accidents) occur among young males well under 25, and another large proportion affects the more fragile bones of the elderly. Of all admissions only a relatively small number are aged between 25 and 45. Here again therefore the yield was small.

(3) *Mass X-ray Volunteers.* Attendance at some of these public X-ray sessions convinced me that the large numbers of volunteers who availed themselves of this nowadays fairly commonplace facility represented an almost unselected proportion of the community at any rate for the purpose of this investigation. It could be argued that if these people took the trouble to have this check up they would in other respects be more careful about their health than the average and would therefore be healthier and longer-lived than the population as a whole. There is, of course, no evidence to verify such a contention, and it seems to me that most people have their chest X-rayed at some time or other in their life nowadays. Since there seemed to be no other way to see large numbers of people it was decided to use them.

Volunteers for mass X-ray are unfortunately not required to strip to the waist nowadays and the turnover at sessions is so rapid that there is no question of getting them to do so. Similarly there is no time for questioning and only the following details could therefore be obtained:

Name
Age
Occupation
Presence or absence of grey hair
Presence or absence of arcus senilis

Thus in the only place where large numbers of people could be contacted, very little detail could be obtained. Existing studies had to be relied on to a large extent, therefore, for comparison purposes.

Radiological Survey

Since 1944 annual chest X-ray has been an established routine for all ratings and officers of the Royal Navy. The skiagrams of a daily quota of ratings are recorded on 100 m.m. film by barracks X-ray units and sent to the local service radiologist for review. During a series of these review sessions, the magnified films were scrutinized for the presence or absence of calcification of the costal cartilages of first ribs or elsewhere. This study was carried out by the radiologist and myself as follows:

The radiologist reading the film stated the presence or absence of calcification in these sites without any knowledge of the age or any other particulars of the subject. The card was handed to him only after he had made his decision. The result was then marked in accordance with the age group. Where there was any doubt about the presence or absence of calcification, a negative report was given.

It was decided to use Fischer's (1955) large study for comparison.

Life Expectancy of ex-Naval Ratings

(1) Towards the end of 1960, at the department of naval accounts, the head of department gave me access to the files of all the naval pensioners who died in 1959.

As previously stated each file contained the death certificate with age and cause of death

(2) In mid 1961 a survey of the number of pensioners alive was made and a "fiftieth sample" was examined for age in years as follows every naval pensioner has a number which is allocated in sequence as they are enrolled on the pension list Enumeration is unselective For a "fiftieth sample" all the cards whose numbers ended in 33 or 77 were selected It will be observed that two of every hundred ratings would thus be obtained randomly The age of each rating whose card was thus exposed was noted

(3) The total number of deaths for 1959 and 1960 were noted

From the above information the life expectancy of naval pensioners was deduced

Summary

The unreliability of any single physical sign of ageing was noted

The prospect of a composite of physical signs to be used as an index of ageing was considered

Of a number of possible physical signs the following were selected

(1) Grey hair

(2) Arcus senilis

(3) Campbell de Morgan's spots

(4) Range of visual accommodation

(5) Nocturia

(6) Costal cartilage calcification

(7) Longevity

The above were thought to be subject to fairly easy elicitation

Details of the investigation procedure and the naval and civilian sources of subjects for study are described

(*To be continued*)

SEA-SICKNESS

Causes Effects, Treatment

By Surgeon Captain S MILES, R N , and Surgeon Lieutenant J J BRAND, R N

Reproduced from *Motor Boat and Yachting*—M d August 1962

To a great number of sailors professional and amateur there is nothing so likely to ruin the pleasure of sea voyaging especially in small boats as sea sickness Furthermore particularly in the small vessel with a limited crew the resulting disability and breakdown of morale may at times when alertness and skill are most important, be disastrous For safety s sake, therefore as well as comfort it is important to do every thing possible to prevent cure or at least alleviate the condition

In medical practice there are few "sicknesses where the results of advice and treatment can be so disappointing There are still great gaps in our knowledge concerning causation predisposing factors resistance sensitivity individual variation changes in behaviour adaptation and other physiological responses to motion and the effectiveness of countless drugs and other forms of recommended treatment.

All that can be done therefore is to review current thought in the hope that a rational approach may help towards a better understanding of the subject and to offer some limited advice

The Causation of Sea-sickness

Man is fundamentally conditioned to existence in a two dimensional plane He maintains the upright posture by three simple mechanisms Firstly situated in the skull near each ear are three horseshoe shaped fluid filled canals in three different planes Any movement causes fluid flow and granule movement within them to signal the direction of that movement to the brain Secondly the muscles and joints responsible for locomotion and position are sensitive to the pull of gravity This constant downwards pull enables them to fix the body Thirdly in a world of stationary objects of verticals and horizontals the eyes are well able to play an active part in the maintenance of balance Of these three factors the first is by far the most important but all of them are sending continuous reports on the situation of the body in its environment to the balance centre in the lower part of the brain Where the environment is disturbed as in motion and the anchors of stability are lost, various signals flood into the brain centres, necessitating involved counter measures

The disturbances caused in the control-centre may affect neighbouring centres one of which is responsible for the initiation of vomiting This sensing a state of alarm sets the vomiting mechanism in motion Furthermore the unusual motion may also cause the stomach contents which are largely fluid to swill around whilst adjacent organs may exert undue pressure upon it Such activity also sends signals

of alarm to the vomiting centre. This, together with a general feeling of apprehension or fear, will most probably result in a rapid and repeated emptying of the stomach. Much of this process is a physical one, but there is no doubt that in sea sickness there is also an important emotional factor. The feeling of nausea and vomiting is not an unusual reaction to fear, and many are very frightened by bad weather although they must control and conceal their alarm. The vomiting of fear may be the lessening of the load prior to flight.[1]

Once the complexity of man's response, which is the combination of physical and psychological reaction, is appreciated, the difficulty in giving a rational explanation will be apparent. Add to this the fact that individuals vary so much in their sensitivity—some being immune to the fiercest gale and others prostrate at the thought of a sea voyage—and the complications grow. Consider also the unlimited patterns of motion that combinations of ships and boats of all shapes and sizes may offer in an equally unlimited variety of seas, and the whole challenging concept of environmental and individual chaos is apparent.

The Manifestations of Sea sickness

One of the joys of this life is the profound individuality of the members of the human race and, as might be expected, there is a reflection of this in their response to motion. At the extremes are those who are completely unaffected and those who are fully incapacitated. The commoner manifestations are yawning, lassitude, discomfort, dizziness, nausea, headache, loss of appetite and ultimately vomiting.

To study the condition and for practical convenience it is possible to divide individuals into four groups.

(i) Those who are unaffected and can eat anything whatever the conditions.

(ii) Those who feel unwell but do not vomit.

(iii) Those who vomit but are able to show interest in their surroundings and carry on with whatever they may have to do.

(iv) Those who are completely immobilized.

Of course, these groups are not watertight and the distribution therein will be influenced by the severity of the condition and individual susceptibility. There are also a limited number of others who may feel quite well at sea but become ill on stepping ashore.

Predisposing Factors

There are many circumstances which may well increase the susceptibility of an individual to sea-sickness. Among these may be listed:

(i) The very thought of it.

(ii) Age, apart from young babies, children tend to be more susceptible than adults.

(iii) Excessive consumption of alcohol and food, particularly at the pre-embarkation party or feeling "off colour" from any cause.

(iv) Hot and stuffy cabins or lounges.

(v) The sight of other sufferers
(vi) The smell of oil from the engines or cooking in the galley
(vii) Lack of something interesting to do
(viii) Watching the sea or a swaying mast
(ix) Inexperience
(x) Lack of sleep
(xi) Plain fear

Alleviating Factors

With equal truth it may be said that other conditions may lessen the chances of being sick such as

(i) Experience of sea conditions
(ii) Habituation to the particular motion
(iii) Temperance in food and drink.
(iv) Interesting activity
(v) Plenty of fresh air
(vi) The need to cope with an emergency
(vii) Physical fitness

Control and Treatment

Apart from a wide variety of drugs and pet routines there is much sound advice that can be given to the potential sufferer Only a few need to be advised to stay on land The foregoing paragraphs suggest some hints but in addition reassurance can go a long way Anxiety to avoid the humiliation of vomiting may in itself induce it There is no doubt whatever that most people though not all sooner or later gain their "sea legs" and settle down They may be helped in this achievement if, when nausea assails them they are advised to rest quietly lying down in a darkened cabin Should this be impossible relief may be obtained by sitting with the head down between the knees When their symptoms lessen they should if conditions permit, get out on deck and keep looking at the horizon, which is the one sure thing which may give them a 'postural fix' in the turbulent surroundings Food and drink should be taken in small quantities and often and be simple in nature Cups of sweetened tea with very thin bread and butter or crackers, are as good as anything Fatty foods should be avoided As adaptation to the motion occurs the diet can be gradually built up Those with a responsible job may be luckier but it is preferable if they can put it aside and take avoiding action if nausea seems to be getting the upper hand

Treatment

When treatment is considered it must be admitted that there is no panacea at present Many hardened sea-dogs will swear by their own special routines which vary from sequences of strange powders taken with ritualistic thoroughness raw eggs brandy, lime juice, stupefying quantities of alcohol pep pills, purges and private

potions to prayer So great is the psychological factor that it must be admitted that where there is faith there is likely to be success

Among the more unusual remedies may be mentioned

(a) Soup made of horse radish and rice seasoned with red herring and sardines

(b) Lemon-juice and sour pickles (no one would even contemplate vomiting a sour pickle)

(c) Sipping cold ginger ale or champagne according to taste or sucking lumps of ice

(d) A hand inflatable body-belt

There are also certain standard remedies of which compounds containing hyoscine hydrobromide give the best results

All these have their side effects which must be balanced against their efficacy and they may, if taken with abundant alcohol, greatly decrease personal efficiency

Once vomiting has started they are useless when given by mouth and consideration is being given to alternative routes of administration

On the other hand, drugs of the antihistamine series are frequently advocated However, they tend to cause drowsiness and again if taken in conjunction with alcohol may be dangerous

The ideal drug still awaits discovery

SOME CONSIDERATIONS CONCERNING THE EFFECTS ON HEARING OF NOISE OF SMALL-ARMS

By Surgeon Lieutenant-Commander R R A COLES, R N

Contributed paper H.21 at Fourth International Congress on Acoustics Copenhagen 21st 28th August 1962

IN the British Armed Services the recent advent of a new rifle reputedly noisier than its predecessor already a recognized hazard e g. Knight and Coles (1960) provided a good opportunity for the introduction of much stricter hearing conservation measures than hitherto In order to lend force to arguments at all levels as to the necessity for this two pieces of information were needed firstly, to know how much the new rifle is noisier than the old one and secondly to ascertain what would be the effects of the noise on men s hearing if they continued to disregard the need for ear protection

This paper deals, in brief with the main results of the investigations designed to answer these questions Also described in more detail are two of the more interesting side issues, namely some measurements of temporary hearing losses following repeated noise exposures, and a study of the relationship between acoustic reflex threshold and noise-induced hearing loss from small arms

Whilst the whole study formed part of the research programme of the R N Personnel Research Committee (Medical Research Council) the opinions and interpretations given here are at present those of the author alone The noise measurements were made by the Admiralty Research Laboratory Teddington but the rest of the work was carried out in collaboration with Dr J J Knight, of the scientific staff of the M R C s Wernher Research Unit on Deafness

The Physical Nature of the Stimulus

The weapon in question was the self loading rifle (S L R) a British modification of the Belgian F N 7 62 mm rifle A standard method of measuring impulsive noise was employed, the overall bandwidth of the apparatus being approximately 20—10 000 c/s

The sound field was found to be symmetrical and with rifle and microphone 2 ft above grass the peak positive pressures measured (relative to an r m s sound pressure of 0 0002 dynes/cm ^{2}) were as follows

2 in from either ear of marksman	168 dB
At approximate position of instructor s ears	174 dB
At approximate position of next marksman in line (6 ft. away)	170 dB

The duration of the main pressure pulse was about 0 2 millisec.

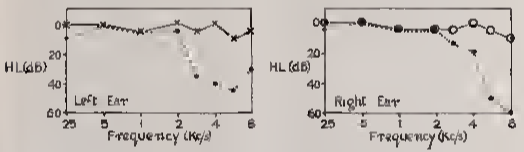
With the old (No 4) rifle the 303 in Lee Enfield the field was also symmetrical but the peak pressures were on the average some 7 dB lower than with the S L R

Hearing Losses

A total of 202 recruits to the Royal Marines were audiometrically surveyed at intervals to provide information on hearing states at entry half-way through training and on its completion The principal noise hazard during their training was the S L R and V 51 R ear plugs were provided for protection against it

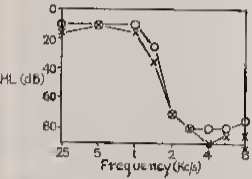
A typical case is illustrated in Figure 1(A), whilst the hearing state of one of his weapon-training instructors is shown in Figure 1(B)

Approximately a third of the squad which used least ear protection during their training sustained hearing losses of not less than 25 dB at 3 4 or 6 kc/s or of 30 dB at 8 kc/s in one or both ears when retested some three weeks after their last noise exposure (Total noise exposure was equivalent to about 300 rounds per man but the noise of other rifles on one or more often both sides of him should not be overlooked)



Case A. Recruit K H P Aged 18-19 Prominent tinnitus and dullness of hearing immediately after shooting if he wore no ear protection Protected his ears on four out of five occasions of firing

X———X hearing before training (left ear)
O———O hearing before training (right ear)
[illegible]—hearing after training



Case B. Corporal W N N Aged 23 Weapon-training Instructor 3 years Minimal temporary symptoms after shooting Thinks he is slightly hard of hearing now (*Note* This subject was *not* one of those included in the measurements of acoustic reflex threshold)

X———X left ear
O———O right ear

[illegible] 1 *Typical Audiograms (hearing loss H L is shown relative to British Standard Normal Threshold for Hearing of Pure tones B S 2497 1954)*

Temporary Threshold Shift Following Repeated [illegible]

Two men exposed their ears without protection to 20 rounds of S L R noise (in a position corresponding to peak pressures of 177 dB) once a week under constant conditions. Audiometric checks confirmed that no measurable permanent hearing loss had occurred at any stage of the experiment.

The noise was mildly painful and resulted in visible reddening and occasional small haemorrhages in their tympanic membranes. Measurements on seven occasions confirmed the finding of Reid (1946) and others that considerable day to day variations in T T S superimposed on a progressive reduction, result from such exposures. Reid suggested that this might have been caused by learning to contract voluntarily the intra aural muscles in anticipation of the blast, or to a "toughening" of the basilar membrane.

Averaged over 2, 3, 4 and 6 kc/s, the maximum T T S we measured was 26 3 dB (on the first occasion) and in the same ear this fell to a minimum of 2 5 dB by the fifth exposure.

Recovery rates were also studied and for full recovery at all test frequencies this fell in the more sensitive subject from needing four days after the first exposure, to between 20 and 70 minutes on the second occasion, and to less than 20 minutes on the fifth.

During all the first seven exposures firings were at regular intervals and immediately preceded by a warning, on two subsequent occasions the rate was irregular and without warning. Subjectively this was reported as being more unpleasant, and in fact it resulted in the T T S returning almost to the initial level.

The conclusion to be drawn from these experiments is that T T S falls with consecutive exposures to impulsive noise. Further it is suggested that the effect described may be due partly to an increase in recovery rate and partly to the acoustic reflex becoming conditioned to come into action before each expected noise exposure, and perhaps to operate more efficiently also. It is interesting, however, to note that in common with other workers, the author has found no such process to result from continuous pure-tone noise exposures.

Measurements of Threshold of Acoustic Reflex

Stapedius and tensor tympani are the names given to two small muscles present in each ear. They can be caused to contract, usually involuntarily, by exposure of either ear to a sufficiently loud sound. Their action is believed to impede conduction of sound to the receptor organ in the inner ear and thereby act as a physiological protective mechanism against noise; this is known as the acoustic reflex.

At the time of the final retest of the last two squads of marine recruits a Madsen Acoustic Impedance Meter, Model ZO 61, became available. Time permitted measurements of the threshold of acoustic reflex at 1 and 4 kc/s in 40 of the men.

The principle of the technique and the essentials of the apparatus have recently been described by Terkildsen and Scott Nielsen (1960). As their account describes the commercial instrument used in the present work, no further description of it will be given here.

Our first finding of interest was that the ascending threshold was frequently up to

10 dB higher than the descending one This suggests that recent experience of suprathreshold noise itself lowers that threshold a change somewhat akin to the conditioning process suggested in the section above

In treatment of the main data of this section, the 40 noise exposed men were divided into three subgroups according to the state of their high-tone hearing The median reflex threshold of the subgroups at 1 and 4 kc/s were then calculated and are illustrated in Figure 2 (The ascending threshold was chosen for its greater stability and its correspondence to the measured auditory threshold)

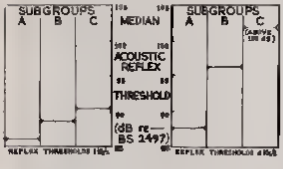


Figure 2 Median Acoustic Reflex Thresholds at 1 and 4 kc/s subdivided by three Grades of Hearing Loss

It is apparent that there is a relationship between noise-induced hearing loss and the threshold of acoustic reflex both at 1 kc/s and at 4 kc/s The observed differences in reflex threshold can hardly be related to the original hearing state of the men in the three subgroups because even after training their median hearing losses at 1 kc/s were almost identical Moreover the distribution of hearing and reflex thresholds in the three subgroups at 1 kc/s was equivalent to that measured in a control group of 23 new entry recruits

Further evidence is gained from 16 men whose actual change of hearing after noise exposure had been measured Those who developed more than average high-tone loss also had the higher average reflex threshold at 1 kc/s

With 4 kc/s tones Jepsen (1951) failed to elicit an acoustic reflex in only one out of 98 ears and Metz (1952) made no mention of any such cases On the contrary, in our control series no reaction could be obtained in 11 out of 46 ears (24 per cent), the maximum stimulus intensity at 4 kc/s being 102 dB and with atmospheric pressure in the external auditory meatus No reaction was found more frequently still (31 per cent) in the 40 noise-exposed men who were subject to acoustic reflex measurement The relatively large size of the latter figure may have resulted from a small degree of selection (for reflex measurement) of those with high tone hearing losses whereas the control group subjects were taken at random from new-entry recruits At 1 kc/s however acoustic reflexes were obtainable (maximum S P L 110 dB) in all but two of the 126 ears tested

Metz (1952) Thomsen (1955) and others have described the use of measurement of acoustic reflex threshold in testing for recruitment Thomsen in particular has stated that a positive test result i e a normal reflex threshold confirms recruitment and

that a negative one whilst not completely excluding a recruiting perceptive lesion is often explained by a conductive element in the hearing loss In the present work on the other hand a positive result at 4 kc/s was often absent in cases of 4 kc/s hearing loss which were of perceptive type and attributable to acoustic trauma Time at our disposal did not allow other tests of recruitment, but it is usually accepted that it is present in cases of noise-induced hearing loss, e g. Glorig and Davis (1961) If this is so then these men probably had poor acoustic reflexes before they developed their hearing losses and a causal relationship between the two is indicated

It should be noted in passing that with individuals, as distinct from the group average, wide variations were found between hearing loss and acoustic reflex threshold There are in addition some less acceptable explanations of the above relationship noise may damage the mechanism of the reflex threshold either independently of hearing loss or by means of hearing loss without recruitment A prospective study including other tests of recruitment is needed to elucidate these points

Conclusions

The measurements of the noise of the S L R and of its effects on hearing are convincing as to the necessity of protecting the ears of men using this weapon Protection would appear to be particularly important early in training because even in absence of noise-induced hearing loss sensitivity to noise appears to lessen with increasing noise experience It must be worn by *all* exposed personnel until a really reliable and easy test of individual sensitivity to noise becomes available towards this goal measurements of the acoustic reflex seem to offer the possibility of an interesting new approach

ACKNOWLEDGMENTS

The author wishes to express his thanks to the Medical Director General of the Navy for sponsoring this contributed paper, and to the Superintendent of Admiralty Research Laboratory Teddington, for permission to publish some details of the noise measurements

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EFFECT OF JET-AIRCRAFT NOISE ON HEARING

By Doctor J J KNIGHT

Wernher Research Unit on Deafness (Medical Research Council London)

Contributed paper H 34 at Fourth International Congress on Acoustics Copenhagen 21st 28th August 1962

INITIALLY the danger to hearing from aircraft noise originated from piston engines and propellers and it primarily concerned the flying crew but with the advent of turbo-jet engines the situation acquired a different emphasis The greater thrust from jet engines is accompanied by greater noise but now the crew protected in many ways from the noise is positioned in front of the engines from which intense noise is directed towards the attendant ground staff In a modern aircraft carrier the aural hazard to the flight-deck party is particularly great on account of limitations in space and time for preparing aircraft for take-off Also the steam catapults from which the aircraft are launched add to the noise at the time of release when the aircraft engines are run at full power

Retrospective Survey

At the end of 1957 a retrospective audiometric survey of 224 men was undertaken to determine whether any damage to hearing had occurred among the flight deck personnel of H M Ships *Ark Royal* and *Eagle* when Sea Venom aircraft at squadron strength had been flying from both ships With this new jet aircraft overall noise levels of 131 dB had been measured between the catapults and 121 dB on the gunnery direction platform (where some of the ships companies assembled to watch flying operations when off duty) Ward (1957) had completed a similar investigation with the U S Navy and had reported that the evidence was exceedingly flimsy for a slightly depressed hearing level being due to aircraft noise He found in his sample that a greater exposure to gunfire noise accompanied more aircraft-noise exposure and he considered the gunfire exposure to be the more probable major cause of hearing loss

A preliminary report was published (Coles and Knight 1959) of the British investigation the differences between the mean hearing losses of those most exposed to aircraft noise and of those least exposed was highly significant ($P<0.01$) at 1 and 2 kc/s Ear protection in the form of flight-deck helmets was provided only after the men with the greatest noise exposure (about 2 500 take-offs in 18 months) had already experienced some 1 200 take offs and at first there were many who did not use the helmets to full advantage Approximately 5 dB of average hearing loss at most test frequencies was found, even in those with least exposure This was ascribed to long exposure to the general noise level of a ship at sea and it has been found to be a

temporary effect. Figure 1 shows the median hearing level of three groups with a minimum of gunfire exposure and different amounts of aircraft noise exposure. Another group is included with considerable gunfire noise exposure in addition and this group shows the typical high frequency notch associated with impulsive noise. Details of the experimental procedure and examination of the subjects were as described by Knight and Coles (1960).

Prospective Survey

During 1958 a prospective study was commenced into the hearing of men who were to work on the flight deck of the newly-commissioned H.M.S. *Victorious*. This ship was the first to carry a squadron of Scimitar aircraft and measurements in *Ark Royal* had shown that the overall noise level reached 149 dB during the free take off of a single Scimitar.

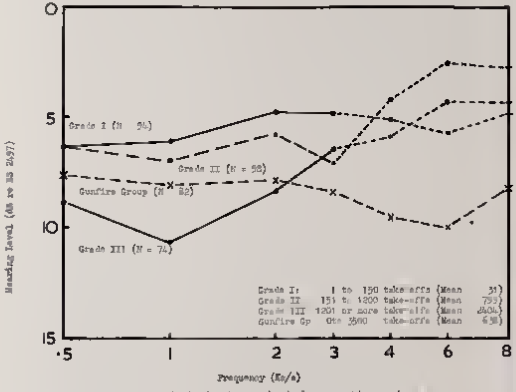


Figure 1. Retrospective study. Median hearing level of groups with aircraft noise exposure.

The first hearing tests of a total of 120 men were completed before *Victorious* embarked her aircraft and two main retests were made in 1959 and 1960 after successive periods of intensive operation. A ship-noise effect was detected at all these stages. After the retest in 1959 of 91 men, 15 were excluded for various reasons and the remaining 76 men were graded according to their aircraft-noise exposure as:

Grade A 0 to 50 take offs (Mean 22) 17 men
Grade B 51 to 1 300 take offs (Mean =541) 59 men

A small average threshold shift in those most exposed (Grade B) had developed which was significantly different ($P>0.05$) at 0.5 and 1 kc/s from the threshold shift of the men with the negligible exposure of Grade A. In fact the latter groups showed an apparent improvement of hearing threshold averaging 1.2 dB throughout the test frequencies when tested under identical conditions. This was taken to represent a measure of a practice effect obtained through an increased familiarity with the test procedure.

The final retest of 45 men was made at the beginning of 1960 after they had been away from aircraft noise for more than 4 weeks. The men were divided into three groups according to their exposure to aircraft noise and their average threshold shifts since the initial test 19 months earlier are as shown in Figure 2 where the categories of exposure are as follows:

Grade C 0 to 1 500 take offs (Mean 603) 16 men
Grade D 1 501 to 2 500 take-offs (Mean 2 022) 5 men
Grade E 2 501 to 4 000 take-offs (Mean 3,358) 24 men

Only 5 men were included in the intermediate group but it was convenient to employ this group to segregate the least exposed from the most-exposed.

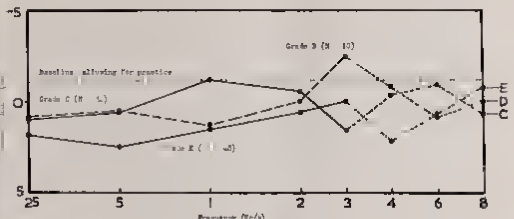


Fig. 2. Prospective study (H.M.S. Victorious). Median threshold shift of groups with reference to initial thresholds.

The average threshold shift measured in the most exposed group was significant ($P>0.05$) at 0.25, 0.5, 1 and 6 kc/s but addition of 1 dB for practice (as found in the 1959 retests) increased the degree of significance and extended its range viz. 0.25, 0.5, 1 kc/s ($P>0.01$), 2 kc/s ($P>0.05$) and 4 and 6 kc/s ($P>0.01$).

Considerable interest attaches to the threshold shifts in the 24 men with an average of about 3 500 take off exposures and attention was given to the distribution of these threshold shifts. Neglecting the small effect of practice it can be assumed that, to one 5 dB step of the audiometer attenuator, there was no reason for a greater threshold shift in the direction of a deterioration than in the direction of an improvement. Then there were at least 14 threshold changes of 15 dB or more for the worse among the test frequencies, these were found to be associated with 9 ears of 8 men.

If, further, it can be considered that only the threshold shifts up to and including 4 kc/s were the result of aircraft noise the 14 threshold changes above reduce to 10 applying to 6 ears of 5 men. That is to say about 20 per cent of the most exposed group of men showed distinct signs of hearing damage after this single commission. Bone conduction tests showed that the threshold changes were entirely perceptive.

A flight deck helmet incorporating leather ear muffs to protect the ears had been introduced in aircraft carriers during the retrospective survey and its use became obligatory. Speech communication during quiet periods was possible by rotation of a speech valve on the side of the helmet. During the investigation with H.M.S. *Victorious* an improved form of flight-deck helmet was issued which employed ear muffs fitting the sides of the head by means of a fluid sealed into a thin plastic skin. The better seal of the ear-muff to the head which was obtained increased the attenuation at low frequencies to about 25 dB. Unfortunately under the severe testing conditions of the flight-deck trouble was experienced through breakage of the fluid seal. When this happened much of the attenuation was lost and hence the ear protection was not as complete as had been intended at this time.

Discussion and Conclusions

In both the retrospective and prospective phases of the study the threshold shifts (measured sufficiently long after the last aircraft-noise exposure to assume that any temporary effects had recovered) have been found principally at 2 kc/s and below. At each stage progressive increase in the average aircraft-noise exposure of the groups corresponded with an increase in their threshold shift. Additionally with the retrospective investigation the difference in the threshold shifts of a group with moderate degree of exposure divided on the basis of whether or not they had worn ear protection, demonstrated that wearing the earlier form of flight-deck helmet gave a significant ($P > 0.05$) amount of hearing protection at 1 and 2 kc/s.

The occurrence of noise-induced hearing loss in this middle range of audible frequencies is unusual. With the typical noisy industrial situation the character of the noise is more often impulsive—either from a hammering process or from some form of regular impact as with a circular saw or a train of gears. Here the resulting average hearing loss is found to be maximal at higher frequencies usually at 4 or 6 kc/s. This finding applies also to the effects of gunfire noise and in Figure 1 where the hearing level of a group of men with aircraft noise exposure and gunfire exposure is shown a gunfire "notch" may be identified together with the lower frequency effect from aircraft noise.

As far as is known, the only other situation in which hearing loss for the lower tones has been reported is that of the borax well workers in Tuscany studied by Bernabei (1953). Superheated steam and other gases gush at high pressure from the geysers producing a noise which closely resembles that of a jet engine in both spectral content and intensity. There is a peak in the noise spectrum in the region of 400 to 500 c/s and Bernabei found an average hearing loss at 500 c/s in a group of these workers.

Subjects with an occupational hearing loss about 4 kc/s are generally unaware of any disability in the early stages before the damage affects lower frequencies but

hearing loss which affects the lower and middle audible frequencies somewhat more than the higher, with a consequent greater social handicap. Men who have suffered 30 to 40 dB losses below 2 kc/s from exposures to jet noise on the flight deck have sufficiently great hearing losses in the speech frequencies to cause them difficulty. Further, the shape of the articulation curve is distorted, indicating that a hearing aid would be unlikely to restore full intelligibility at any output level. Two such cases have been examined recently after accidental exposure without adequate ear protection.

The uniform temporary threshold shift of approximately 5 dB measured in men soon after leaving the aircraft carriers has been noted in many other audiometric surveys of ship-borne personnel. It was not found, however, with naval recruits or with divers living in shore establishments. Similarly, a small group of men from the aircraft carriers tested after spending more than a week in a hospital ashore had substantially normal hearing. Hinchcliffe (1960) has lately found independent evidence of this effect in industrial workers tested soon after leaving a noisy working environment. It is possible that this temporary threshold shift might be due to the action of a protective mechanism in the middle ear (the acoustic reflex) rather than to auditory fatigue.

Acknowledgments

The investigations described above were performed as part of a joint research programme of the Wernher Research Unit on Deafness and of the Royal Naval Personnel Research Committee.

The author is indebted to Surgeon Lieutenant Commander R. R. A. Coles, R.N., for collaboration in examining the subjects and in many other ways. Grateful acknowledgment is given to Dr. T. S. Littler for his advice and encouragement throughout and to the authorities concerned for permission to present this account.

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CONTROLLED CLINICAL TRIAL WITH PROTHIPENDYL HYDROCHLORIDE ("TOLNATE") AS A PREMEDICATION IN ANÆSTHESIA

By Surgeon Commander A O'CONNOR, R N., and

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In anæsthesia a number of drugs have been used singly and in combination to promote a comfortable and relaxed state before and after operation and at the same time to aim at a reduction in the amount of anæsthetic required Morphia and its derivatives have been the main drugs used but the barbiturates have received considerable attention In recent years several drugs have been introduced which were originally used for their anti-histamine properties but their sedative hypnotic action has received increasing attention

The most important group of these compounds now employed for this sedative-hypnotic action are the phenothiazine derivatives of which promethazine and chlorpromazine are probably the most commonly used for premedication, in "lytic cocktails" and hypothermia Much of the original work in this field with the phenothiazines was undertaken by H Laborit and P Huguenard[1, 2] in France and subsequent modifications to their techniques have been introduced in this country[3, 4] to minimize possible hypotension and tachycardia

It is often stated that the phenothiazines have a potentiating effect on anæsthetic agents Dundee and Moore,[5] however do not confirm this and suggest that the "potentiating" action of certain phenothiazines is probably due to their analgesic activity

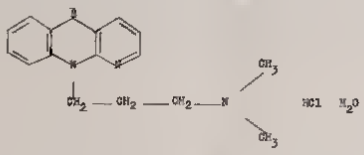
The phenothiazine group of drugs has powerful anti emetic properties and is of considerable value to the anæsthetist in controlling the nausea and vomiting seen with both general and local anæsthesia Unfortunately side effects such as hypotension and tachycardia may restrict their use, therefore it was with considerable interest that we investigated a new aza phenothiazine reported to have strong sedative and anti emetic actions with minimal side effects

Prothipendyl hydrochloride (Tolnate") has been on an extensive clinical trial in this country for psychiatric patients and has been in clinical use on the Continent for over three years for similar conditions and as a sedative in many fields of medicine

The results of a double blind trial with ' Tolnate" as a premedication for sedation and to prevent post operative nausea and vomiting form the substance of this paper

Chemistry and Pharmacology

"Tolnate" is prothipendyl hydrochloride, an aza-phenothiazine with the formula



It is easily soluble in water

At an oral dosage of 10-12 mg./kg. "Tolnate" completely inhibited drug-induced excitement in the mouse and at a subcutaneous dosage of 10 mg./kg. the drug inhibited morphine-induced excitement in the cat. The duration of action of pentobarbitone was prolonged by 2·3 times in the mouse with i.p. administration of 5·10 mg./kg. Similarly the i.p. administration of 5·15 mg./kg. in mice was followed by a significant potentiation of the analgesic action of phenacetin.

Anti-emetic action was also shown in 12 of 16 dogs by 10 mg./kg. s.c. against apomorphine induced vomiting. This anti-emetic action has been shown in human volunteers, vomiting occurring in only 2 out of 13 apomorphine-induced subjects.

Animal toxicity tests both acute and chronic, have shown no pathological changes in liver, kidneys or in the blood picture. Even at high dosages in clinical practice no jaundice or blood dyscrasias have been reported.

Methods and Materials

This trial was divided into two parts. Part one was a pilot trial to determine the suitability of "Tolnate" as a premedication, the second part was a controlled trial to estimate the value of "Tolnate" as a premedication, sedative and a post-operative anti-emetic.

In the pilot trial 30 patients were given 40 mg. of "Tolnate" intramuscularly on completion of the operation before leaving the theatre. The planned blind trial was devised using random allocation tables by means of which two different premedications were given to unselected cases except that acute abdominal and other emergencies were excluded, the greater proportion of these cases are admitted in the silent hours and complete security of the blind trial could not therefore be guaranteed if they were included.

The premedication was given intramuscularly one hour before operation. Premedication "A" contained morphine sulphate 15 mgs. and atropine sulphate 0·6 mgs., premedication "B" contained "Tolnate" 40 mgs. and atropine sulphate 0·6 mgs. Although we realize that morphia itself may cause vomiting, we preferred to use as a control an accepted premedication which could be conveniently administered with atropine so as to preserve the blind nature of the trial and avoid confusing the nursing staff. In previous similar trials the use of morphia had proved satisfactory.

As the drugs could not conveniently be combined in single ampoules and matched

for colour (Tolnate is pale yellow) all injections were given by members of the nursing staff not involved in the trial in any way and recorded as premedication "A" or "B" on the case sheet. The sedative effect was assessed in the theatre by the anæsthetist and all post operative observations were made by one of us (I M M) who was unaware of the premedication given. All procedures and observations were recorded on special individual cards.

The patients were all adults ages 16–60 and were, except for their specific condition, healthy. Anæsthetic agents varied but thiopentone was used for induction followed by either halothane or trilene with pethidine and relaxants as required.

Results

"A" Pilot Trial

In the preliminary trial of 30 patients only one man vomited. This particular patient had had several previous skin graft operations and after each had suffered severely from vomiting—on this occasion he vomited but once and had an otherwise very comfortable post operative period.

"B" Controlled Trial

In the main trial 98 patients were premedicated with combination "A" and a similar number of patients with combination "B". The number of cases of post-operative nausea and vomiting were as follows:

Premedication "A" (Morphia group)		Premedication "B" ("Tolnate" group)	
Nauseated	19	Nauseated	9
Vomited	14	Vomited	1
	33		10

Statistical analysis shows that nausea occurred in 19/98 (19·4 per cent) of the morphine-treated group and in 9/98 (9·2 per cent) of the "Tolnate"-treated patients. Testing this difference by means of χ^2 test gives χ^2 of 3·375 ($0·1 > P > 0·05$).

Vomiting occurred in 14/98 (14·3 per cent) of the morphine-treated group and in 1/98 (1 per cent) of the "Tolnate" treated group. This difference gives a χ^2 of 5·092 ($0·05 > P > 0·02$).

There is thus clear statistical evidence that there is less post-operative vomiting with "Tolnate" than with morphia. There is also a strong suggestion that "Tolnate" is less liable to cause nausea although in this case the difference does not quite reach the 5 per cent level of significance, graphical interpolation in the table gives a value of P of approximately 0.07.

A more detailed breakdown of the nausea and vomiting associated with specific operations is shown in the table.

The degree of tranquility of patients arriving in the theatre was much the same in both groups. In the morphia group 7 patients were apprehensive and none unduly sedated. In the "Tolnate" group 5 patients were apprehensive but of these 2 had been given their premedication only 30 minutes before operation. 6 patients in the "Tolnate" group were somewhat over-sedated. No difficulties were encountered during anæsthesia in either group but in the first 8 hours after operation 4 patients in the morphia group and 4 patients in the "Tolnate" group were very sleepy. Two patients

	MORPHIA ATROPINE				TOLVATE" ATROPINE			
	Total No Case	No Nausea or Vomiting	Nausea	Vomiting	Total No Case	No Nausea or Vomiting	Nausea	Vomiting
Orthopaedic Cases	15	13	2	—	19	18	1	—
Minor Surgical Cases	28	18	6	5	19	19	—	—
Inguino-scrotal	12	9	1	2	15	11	4	—
Cystoscopy	8	4	4	—	6	5	1	—
Laparotomies	6	3	2	1	4	4	—	—
Rectal	8	4	3	1	3	3	—	
Oro pharyngeal	19	13	1	5	27	24	3	
Ophthalmic	1	1	—	—	4	3	—	1
Breast	—	—	—	—	1	1	—	—
Total	98	65	19	14	98	88	9	1

in the morphin group complained of giddiness and one of them fainted on sitting up 2 patients in the same group had rigors and another was very shocked following a long operation for cholecystectomy In the "Tolnate group 1 patient complained of giddiness and 2 of dry mouth symptoms not seen in the morphia group one of the over-sedated patients in the 'Tolnate" group following tonsillectomy was violent during the recovery period No other complications that could be attributed to either pre medication were seen

Discussion

These trials were primarily undertaken to evaluate 'Tolnate as an anti-emetic and secondly to investigate its value as an hypnotic in anaesthesia The pilot trial showed in 30 patients a very satisfactory response as an anti-emetic drug In the controlled trial 196 patients undergoing surgical operations were included and we have shown that the incidence of post operative nausea and vomiting was 10 per cent with Tolnate against 33 per cent with morphia This low incidence of nausea and vomiting after premedication with Tolnate is reported by several observers[6, 8] and is reported as equally reduced when used either parenterally or orally[9] but in this particular series Tolnate was given with cyclobarbital

The pre operative sedative-hypnotic effect was good with both premedications but Tolnate was more satisfactory in the post-operative period The 6 patients who were somewhat over sedated with "Tolnate before the operation gave no trouble before or after operation with the exception of the one mentioned above who was violent in the post operative period None of our patients showed any undue depression of reflexes We did not find that either premedication had any obvious potentiating effect on subsequent anaesthesia although a number of Continental investigators have considered that 'Tolnate does have this effect [8, 7, 8]

No trouble was experienced with either hypotension or tachycardia in this series Although it is reported that "Tolnate is less troublesome in this respect than chlorpromazine and other phenothiazines,[10] these cardiovascular side effects must be looked for especially in the elderly during operation and in the early post operative period Should hypotension be of such severity as to require vasopressors then nor adrenaline should be used and never adrenaline [11] The latter drug may cause a further reduction of blood pressure the so-called 'epinephrine reversal effect

No trouble was encountered with excessive drying of the mouth but as "Tolnate" in common with many of the phenothiazines has an anti-cholinergic action the doses of "Tolnate" and atropine or scopolamine should be modified when working under the conditions of high temperature which may be encountered in the tropics.

The giving of routine pre-operative antiemetics is perhaps controversial. It is generally accepted that except in those fields of surgery such as ophthalmology, where vomiting could be disastrous anti emetics should not be given as a specific addition to the premedication but are best given as required at the conclusion of the operation. There is, however, a definite place in anæsthesia for a drug which has a satisfactory sedative hypnotic action with effective anti-emetic properties and only minimal side effects. Our experience with prothipendyl ("Tolnate") shows that this drug fulfils this requirement and we consider that it is worthy of extended trial which might include less fit and more elderly patients than our own.

Summary

A pilot trial was undertaken and showed that prothipendyl ("Tolnate") was an effective anti emetic. This pilot trial was followed by a controlled trial using prothipendyl and atropine against morphine and atropine. There were 98 patients in each group and results showed that only 10 per cent of patients had either nausea or vomit in the prothipendyl group against 33 per cent of patients in the morphia group. In both groups pre- and post-operative sedation was satisfactory and side effects were minimal, and those that occurred did not worry either the patient or the anæsthetist. Prothipendyl is considered to be a good anti emetic with satisfactory sedative hypnotic properties and will be valuable as a premedication drug.

ACKNOWLEDGMENTS

We wish to thank Surgeon Rear-Admiral D. D. Steele Perkins, C.B., C.V.O., Q.H.S., F.R.C.S., F.R.A.C.S., for permission to publish this article. In addition we would like to thank Mr. J. V. Smart, B.Sc., M.I.Biol., F.S.S. for undertaking the statistical analysis of our results and to Mr. P. S. Matthews, B.Sc. for the translation of specialized German and French papers quoted in the paper.

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THE RELATIONSHIP BETWEEN MORALE AND HEALTH IN A SHIP'S COMPANY

By Surgeon Lieutenant J. A. SAVIN, R.N.

Introduction

A RECENT survey of medical records kept during 14 months of a commission aboard a frigate in the Far East Station surprisingly showed that the incidence of a wide range of apparently unrelated disorders fluctuated in a remarkably similar way. This paper contains a brief description of these fluctuations and some speculations as to the causes of the apparent linkage between them.

Method

The monthly incidence of three major groups of disorders was ascertained and recorded graphically as follows:

Figure 1 Total complaints

Figure 2 Skin, ear and septic complaints (these were grouped together since the majority of the ear troubles was due to otitis externa which is basically a skin disorder)

Figure 3 Coughs, colds and sore throats

Figure 4 Minor trauma

Predictions

(a) It has been shown experimentally that a decrease in environmental temperature leads to an increase in susceptibility of the upper respiratory tract to infection. A widespread impression exists that the torrid zone encourages a high incidence of skin disorders and sepsis. In a commission which has encountered both hot and cold climates one would expect the incidence of skin troubles and sepsis to be inversely related to that of upper respiratory tract infections.

(b) One would expect the incidence of minor trauma to be unrelated to the climate encountered and to remain at a steady level.

(c) Even if predictions (a) and (b) were untrue, any correlation between the incidence of the three groups of disorders mentioned would be unexpected.

Results

As can be seen, Figures 1, 2, 3 and 4 show a very remarkable similarity, upsetting such predictions. February 1962 in each case forms a trough between two peaks.

Speculations

It is hard to imagine factors affecting each of these three disease groups in a similar way.

The incidence of minor trauma might be related to the amount of sport played

and this should in its turn be inversely related to the number of days spent at sea per month. No agreement is seen between the actual figures for days at sea per month and for the monthly incidence of minor trauma on this ship. Presumably the incidence of minor injury is a measure of the number of accidents happening to the ship's company i.e. a yardstick of "accident proneness". It has often been demonstrated that when a person is angry or sad he is more liable to have accidents than when he is happy. Perhaps the variations in the incidence of minor injury are bound up with variations in "morale" of the ship's company.

Skin diseases are well known to be strongly affected by psychogenic influences and it is not difficult to surmise that they may be related to "morale". It is however hard to accept that the incidence of upper respiratory tract infection is in any way so related.

Further Investigations

Direct measurements of morale are difficult to make, unreliable at the best of times and grossly subject to the mood of the observer. Indirect measurements are therefore more useful. One such is the incidence of frank psychiatric disease on board (Figure 5 shows this). Numbers here are very low and generalizations are made with temerity. All cases were anxiety states and it is possible that they mirror a general feeling of tension in the ship's company. The peak in May 1962 coincides with that in the previous figures.

Another indirect measure is the incidence of punished offences. Most of the naval officers to whom I have spoken hold that in a happy ship has little crime and that the converse is also true. Figure 6 shows the incidence of punished offences. The degree of similarity between Figures 1, 2, 3, 4 and 6 is most striking.

The majority of punishments are for leave-breaking—usually for sexual reasons. The incidence of venereal diseases (dotted line on Figure 6) might therefore be expected to follow that of crime. For the first 8 months of the 14 months a similarity can be seen. Again February 1962 produces low figures followed by a rise in March and April and then a gradual decline.

Discussion

It does not seem reasonable to say that people are ill because they commit and are punished for crimes or that they commit crimes because they are ill. Perhaps common factors affect the incidence of both punished crime and sickness. Arguments have been advanced to show that minor injury, skin disease and punishment returns may to some extent be related to "morale". It is more difficult to see a connection between upper respiratory tract infection and mood, though perhaps when morale is low the threshold for complaint for any disease is also low. The fluctuations in all groups considered is large and the effect of the common factor or factors is therefore important.

Viewing the commission impartially a possible cause for the early peak (September 1961) might be the immediate effect of withdrawal from England and from family life. A possible cause for the second peak (April and May 1962) might be the approach of the long-threatened general inspection—this was certainly the cause of the crop of anxiety states at this time.

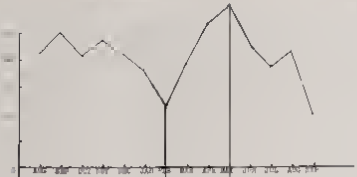


Figure 1. Incidence

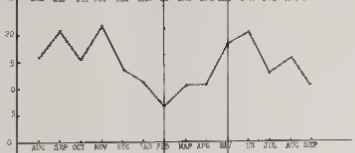


Figure 2. Skins etc

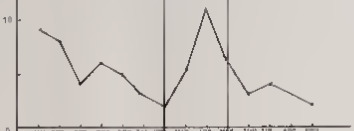


Figure 3 Coughs colds etc



Figure 4 Minor trauma

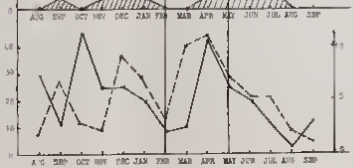


Figure 5
Psychiatric disorders

Figure 6
Punished offences (ven
ereal diseases — dotted
line)

Suggestions

A combined chart showing punishment returns and incidence of sickness would probably act as a useful barometer of the morale of a ship both for the commanding officer and for higher authority

Consideration of these charts for a large number of ships might reveal which factors tend to raise and which to lower the morale of a ship's company. Those which lower morale should be carefully controlled. It might, for example, be sensible to substitute surprise inspections for pre-arranged ones. In this way the two month period of high crime rate and high sickness rate which seemed to accompany the inspection might have been avoided.

Predictions of fluctuation in morale should be possible and leave periods should be carefully timed to anticipate or to coincide with periods of probable low morale. Similarly, medical officers in charge of more than one ship should move from ship to ship in anticipation of predicted peak sickness periods.

Summary

Similarities exist between the variations in incidence over a period of 14 months of three apparently unrelated disease groups. These variations are closely paralleled by variations in the punishment return.

The relationship between the incidence of punished crime and of sickness are discussed and "morale" is suggested as a common influencing factor.

Suggestions for the practical use of these relationships are made.

THE TREATMENT OF DEPRESSION WITH TRANYLCYPROMINE ("PARNATE")

By Surgeon Commander W CULLEN, R N

Depression is one of the common symptoms of illness it can occur as a symptom in physical illness it is often seen as a reaction to the everyday stresses of life, it presents on other occasions for no obvious external reason In a consulting room it is possibly one of the most frequent symptoms of all though it is often presented by the patient in terms of physical illness which may initially obscure the underlying depressive illness

Depression can vary from a mild moodiness and lowering of spirits with loss of energy and loss of enthusiasm for life to a state where the intensity of the depression is such that the patient either becomes stuporose unable to move or to take any positive step to help himself or becomes so agitated that life becomes unbearable for him Then the danger of suicide one of the principal complications of depression becomes a very real and immediate problem and is easily recognized by the observer

The risk of suicide is less obvious however in cases where the depression is less severe but it exists to a greater or lesser degree in all cases of depressive illness All that may be required is for the opportunity for suicide and a down swing of mood to coincide if this happens suicide may well follow It is the belief of the writer that this is the explanation of many cases of suicide which examined in a superficial manner, suggest no cause for this act

Another aspect of depressive illness which is not uncommon but which is not always associated by many with depression is the violence to the extent of murder, which the depressed patient may show He may kill his family to remove them from the unhappiness he is experiencing and which he believes may be their lot also

Less spectacular but at least as important, is the vast volume of human unhappiness and misery which depression entails.

These aspects of this form of nervous illness have made the study and treatment of depression a matter of great concern to the community and in consequence the treatment of depression has been wide and varied over the years and a voluminous literature on this subject has accumulated

The treatment of depression over the last century can be divided into various phases At first, after the period of "Humane Reform" initiated by Pinel in 1792, treatment was centred on improving the conditions under which patients lived, they were moved from dungeons and cellars, chains and other similar forms of restraint were removed and a healthy active life under the care of sympathetic and kind nurses was instituted.

Many patients responded to this treatment, some as a result of the natural remission of the depression—depression by its nature often resolves spontaneously—and others as a result of intensive personal care and encouragement, as happens even today in mental hospitals when chronic patients have been seen to respond to retraining and resocialization without any more specific form of therapy

After this period a long search commenced for some more specific form of treatment Many drugs were employed, some sedative some stimulant, hydrotherapy the treatment of focal infection and occupational therapy were also tried

Eventually in the 1930s, insulin and Leptazol (Cardiazol-Phrenazol) were introduced Insulin was found to have little positive effect in depression Cardiazol, however was different It was quickly found to be an effective method of treatment and its use became widespread As time went on however it became clear that there were serious disadvantages in using this drug During its administration it produced feelings of intense fear and apprehension and the patient not infrequently complained of a feeling of impending death It also had the disadvantage of being impossible to control once it had been given to the patient If given by intravenous injection if all went well, the patient quickly had a major fit and recovered quickly thereafter This might not happen however and the fit might be delayed for some considerable time or simply not develop, leaving the patient very frightened and disturbed At other times particularly if the Cardiazol was given by intramuscular injection there might be a series of fits at intervals which it was impossible to determine in advance

This led to a search for a method of inducing major fits since this property of the drug seemed to be the "effective factor" of Cardiazol in the treatment of depression

In due course electro-convulsive therapy was introduced. This was simply a method of inducing major fits in conditions where the convulsion could be controlled where the timing of the fit could be predetermined where the patient was not exposed to the feelings of fear and apprehension induced by Cardiazol and where, once the treatment was completed there was no risk of further fits in the ward

Electro-convulsive therapy was quickly found to be a reliable method of treatment Its use quickly became general in psychiatric treatment and it remains in general use today Electro-convulsive therapy carried with it, however a very definite risk of injury and even death The nature and violence of the fit induced was such that it could be given only to physically healthy patients even then, if the convulsion was not properly controlled by the treatment team fractures were not uncommon

Modifications—relaxation by curare-like drugs and anaesthesia have now reduced the risk and widened the scope of this treatment by allowing anyone who is sufficiently fit to accept a general anaesthetic to receive treatment

There remained, and still remains the difficulty that treatment can only be given when the patient is either an in-patient in hospital or able to attend as an out-patient and able to take a whole day off work

In addition E C T may interfere with memory and this further reduces the efficiency of this form of treatment when used for out patients It prevents efficiency at

work from improving as the depression clears and so is limited from this point of view as an effective method of treatment

These limitations in the use and efficiency of E C T led to further research into this problem and ultimately to the production of drugs which would be effective in the treatment of depression both in hospital and in general practice and which would allow suitable cases to be treated without interruption of employment and without disturbance to the patients more personal environment

One of the first developments in this field was the observation that iproniazid when used in the treatment of tuberculosis had as a side effect a lightening of mood and mental stimulation of the patient Iproniazid and similar compounds were found during study of this property of these drugs, to block the depressant effects of reserpine on behaviour and mental alertness and to elevate the mood in depressed patients

Biochemical investigation showed that these drugs have the ability to inhibit the amine oxidase sytem and so increase the level of serotonin in the brain and particularly in the hypothalamus

It has since been postulated though this view is not accepted by all workers in this field that depression is related to changes in the level of serotonin concentration in the brain tissue and that depression may be caused by a change in the normal level of monoamines in the brain which may influence the hypothalamic outflow to the cortex thalamus pituitary and autonomic ganglia Many drugs based on this principle are now available for use

One of these now in common use is Tranylcypromine It is proposed now to consider this drug in greater detail

Tranylcypromine is a non hydrazine inhibitor of monoamine oxidase It is related to the amphetamines has the chemical formula trans-dl-2-phenylcyclopropylamine and is said to have been shown *in vitro* and *in vivo* tests to have 200 times the monoamine oxidase inhibiting action of iproniazid

One of the early papers on this drug. Roebuck and Maccubbin (1959), discussed the role of monoamine oxidase inhibitors in the treatment of depression in general and the use of this drug in particular They reported on a group of 55 patients; 39 women and 16 men whose ages ranged from 27 to 80 years The diagnosis of this group included—neurotic depressive reaction involutional melancholia psychotic depressive reaction, manic depressive psychosis and chronic brain syndrome They found that the drug was effective in 78 per cent of the patients 54 per cent were regarded as showing marked improvement 24 per cent showed moderate improvement and 22 per cent were not benefited by the drug Side effects were slight and were noted in only 11 of these patients they included insomnia headache, dizziness anorexia and palpitations No alteration in the blood picture was noted and no disturbance of liver function was demonstrated They concluded that Tranylcypromine was an effective drug in the treatment of depression and that it was more useful in the treatment of neurotic and reactive depressions than in melancholics or the more severe depressive states

Peterson and Mellrayer (1959) also reported in similar terms on a group of 52 patients All were women suffering from depression of varying types with an age

range of 24 to 85 years and an average age of 54 7 years The dose given was 10 mgms twice a day orally in most cases with a maximum of 20 mgms twice a day in one case At the end of the treatment period of 3 months reported 17 patients had been discharged from hospital and 11 were ready for discharge others were improving and would be fit for discharge In 8 cases where the danger of suicide was great a short course of E C T was employed at the beginning to eliminate this danger it was also noted in relation to this that E C T and treatment by Tranylcypromine at the same time presented no problem The response to the medications was quick in most cases and up to the date of the report no patients had relapsed after discharge from hospital

A further point made in this report is that E E G studies were carried out on 5 patients No changes in the records following treatment were demonstrated

In 1960 Agin reported on a further series of 44 patients 34 men and 10 women in an age group 20 to 71 years with an average age of 46 years, suffering from depression as the presenting symptom

He found a "satisfactory" improvement in 77 per cent of the cases and noted that the response to treatment was evident within 72 hours of beginning treatment and that the optimum improvement was observed in 10 to 14 days Liver function test values remained normal throughout the treatment and side effects including insomnia dizziness, anorexia, cramps and constipation were easily controlled by reducing the dose of the drug Lemere (1960) also reported favourably on the use of this drug in depressive illness he noted in addition that apathy, withdrawal and depression in schizophrenics responded to this drug Freyhan (1960) was less favourably impressed with this drug he reported a failure rate of 42 8 per cent using this treatment in cases of depression Lessa (1960) also reported unfavourably on this drug with a series of 45 patients

On the other hand Whittaker (1960) was favourably impressed In a series of 53 patients 27 were completely relieved, 17 partially relieved and only 7 were unchanged This group was a middle-aged group of 35 women and 18 men age range 34 to 60 with an average age of 45 living in a small town in New Jersey

In 1961 Pelzman reported success in treating neurotic depressive illnesses with this drug

Lurie and Salzer (1961) reported a further series of 84 patients treated with this drug A recovery rate of 74 per cent was obtained the incidence of side effects was minimal and no case of blood dyscrasia or jaundice was reported Some of these cases were followed up and no relapse was reported during up to a year after treatment.

In this country Hemphill (1962) in a paper surveying the general field of tranquillizing and anti-psychotic drugs in out-patients and general practice noted that Tranylcypromine and Trifluoperazine in combination were effective in the treatment of anxiety depression He also noted that no case of jaundice had been reported with Tranylcypromine ("Parnate") and that this drug was claimed to be rapidly effective in depression

Fullerton, A G., Boardman, R H., Bethell, M S and Conway, Stella, reported also favourably in this country on the use of these drugs in combination They claimed

a satisfactory result in 70 per cent of cases in a series of 60 patients ill suffering from depressive illness.

A group of medical practitioners (Anthony, G. S., Brown, I. D., Dawes, K. S., Mellor, F. R., Pickering, F. C., and Salkeld, D. V., 1961) also reported favourably on the use of these drugs in the treatment of depressive illness. Out of a group of 256 patients, all suffering from depressive illness, 180 were improved.

Other reports in this country suggest, however, that caution must be exercised in the use of this drug.

Clark (1961) reported a series of 30 patients treated with this drug. Three of these cases developed hypertension and a slow pulse, two developed photophobia and one vomited. All three had neck stiffness and complained of severe occipital headache which spread to the vertex. All three recovered when the drug was discontinued. Aldridge and Oakley (1961) reported a similar hypertensive episode in a patient treated with this drug. Another similar case was observed by Bass (1961).

In January 1962 Rae and Harriman reported a further case of hypertension, headache, vomiting and neck stiffness in a patient receiving this drug. The patient quickly recovered when the drug was stopped. Dormer (1962) has also reported a further similar case.

A fatal outcome in a case of a man aged 27 years receiving Tranylcypromine is reported by McClure (1962). Hypertension and headache on the eighteenth day of treatment with this drug were quickly followed by unconsciousness and death within 4½ hours. Post-mortem examination showed a sub-arachnoid haemorrhage from a ruptured aneurysm of the left posterior communicating artery.

A further fatal reaction associated by Tranylcypromine, in this case in combination with Methylamphetamine, has been reported recently by Mason (1962). This patient was aged 39 years, while under treatment he complained of severe vertical headache. A left hemiparesis developed, blood appeared in the cerebro-spinal fluid and he died 60 hours later. Post mortem a massive cerebral haemorrhage was found to have destroyed the basal nuclei and internal capsule on the right side, bursting into the ventricular system. There was also a small pontine haemorrhage. The cerebral arteries showed considerable atheroma for a man of this age. His blood pressure before treatment commenced was recorded as 150/100 mm. Hg. this was the only abnormal finding on physical examination at this time.

Discussion

The literature surveyed in this review suggests that 'Parnate' is an effective drug in the treatment of depression.

Most workers have reported a recovery rate of about 70 per cent in the cases treated. No cases of disturbance of liver function or of blood dyscrasias have been noted and E.E.G. studies have shown no change in the pattern of cerebral activity during treatment.

Side effects in general have been slight and usually easily controlled by alteration in the dosage of the drug given. Possibly the most severe side effect reported has been the severe headache of which a number of patients have complained. Generally this

headache has responded to alteration in dosage, in some cases stopping the drug has been necessary

In two cases death by cerebral haemorrhage has followed the headache during treatment with the drug. How far "Parnate" can be directly associated with these two cases is a matter for speculation.

On the one side it must be remembered that this drug is now in common use and that many thousands of cases have been treated successfully with this drug without any special difficulties being reported. In contrast with this view, it has equally to be accepted that it is known that "Parnate" can influence the blood pressure of the patient.

Whether these two deaths would have occurred at this time in any case is again a possibility which must be borne in mind. Spontaneous rupture of a cerebral aneurysm is always a possibility; in one case it is reported positively that the cerebral vessels were showing atheromatous changes out of keeping with the patient's calendar age.

What these two cases suggest to the writer is that this drug is a potent weapon which must be used with skill and caution. Hypertension must be regarded as a sign that extra caution must be exercised and that the dose of the drug should be quickly reduced and perhaps stopped particularly if the headache which seems to be associated in many patients with hypertension persists.

As regards other side effects which have been observed, the writer whose experience of this drug is admittedly limited would single out one for special note. A case seen by him quickly swung from depression to a relatively mild hypomanic which persisted for some months even though "Parnate" was discontinued. A further side effect in another patient which led to the drug being discontinued was a persistent hypotension which was very distressing to the patient; this complication quickly disappeared when "Parnate" was discontinued.

As regards other aspects of the treatment of depression by "Parnate," it is a little disappointing to find that in the literature available to the writer no trials have been conducted which might help to eliminate possible fallacies in the results reported.

Depression by the nature of the illness, is self limiting and remission can be expected in most cases no matter whether any treatment is offered to the patient or not. Again neurotic depressive reactions are generally quickly influenced by changes in environment and sometimes even by the feeling—which the doctor may give, particularly if he is trying to assess the effects of a new drug—that someone is interested in the patient and trying to help.

Double blind trials and methods of assessment of the drug which involve the use of sequential analysis would have been most interesting in this respect. Trials such as these are of course very difficult to arrange and time-consuming and it is only slowly that one can build up a group of sufficient size to justify reporting on any drug.

In spite of these criticisms, however, one is left with the impression, after reading the literature and using the drug, that "Parnate" is effective in the treatment of depression and that used with skill and caution in suitable cases, it can quickly relieve the patient of the misery and unhappiness of depression.

Summary

The treatment of depression by Tranylcypromine ("Parnate") is discussed and the literature relating thereto reviewed.

It is concluded that this is an effective method of treatment.

ACKNOWLEDGMENT

I am indebted to the Medical Director General of the Navy for permission to publish this article.

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Clinical Notes and Cases

EOSINOPHILIC GRANULOMA

By Surgeon Captain (D) A MACDONALD-WATSON, R N., and
Surgeon Lieutenant-Commander (D) J D SIEVERS, R N

THE patient, a leading electrical mechanic aged 26 was discharged home from his ship then in South American waters, with a diagnosis of adamantinoma at the angle of the left mandible and admitted to hospital for investigation on 22nd December 1961

Previous History

He had complained of pain in the area of the lower third molar (left) on 6th November 1961 when it was found that this tooth was grossly carious and non vital It was therefore extracted under a local anaesthetic No X-ray was taken at this time Three days later he received an accidental blow from his young daughter on the side of the face which aggravated the pain and resulted in swelling of the cheek On 11th December 1961 he again attended for treatment complaining of pain and persistent swelling at the angle of the left mandible An intra oral X ray showed that the socket of $\overline{6}$ appeared healthy An extra oral X ray view of the mandible taken with a ship's portable X ray apparatus showed a radiolucent area between the $\overline{6}$ socket and the angle of the mandible Consultant opinion on arrival in Brazil indicated the possibility of an adamantinoma and the patient was therefore invalided home

On Examination in Hospital

On 22nd December 1961 it was found that there was a limited degree of swelling of the cheek which was soft and slightly tender There was slight trismus and intermittent pain radiating up the ascending ramus There was no palpable lymphadenopathy

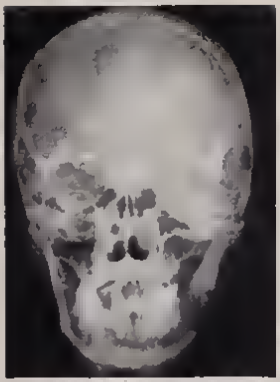
The radiologist's report on the new X-rays which were taken was as follows

"A sharply demarcated area of bone destruction of 1 inch diameter is seen at the angle of the left mandible Its margins are slightly crenated but no central long strands or trabeculæ can be seen at present The lesion extends through the mandible at this site and in the anterior view it can be seen to be expanding the outer table producing localized periosteal reaction *Conclusion* By its situation and destructive nature the most likely diagnosis would be an adamantinoma."

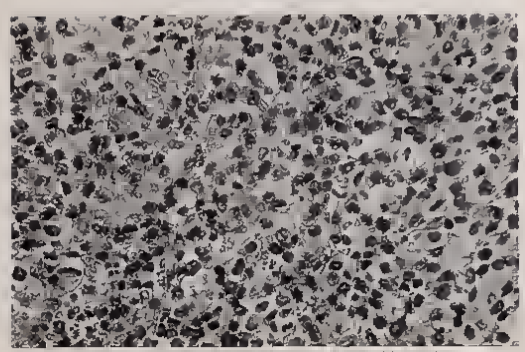
The patient was referred for consultant opinion which was substantially in agreement with this diagnosis

At Operation (By Mr N L Rowe Holy Cross Hospital Haslemere)

An external approach was made to the lower border of the mandible and the masseter and periosteum stripped up from the ascending ramus It was found that yellowish soft tissue mass had perforated the outer plate of bone and that the inferior



the angle of the mandible



dental bundle was so involved as to require removal with the tumour. The inner plate was also found to be perforated so that continuity of the mandible was only maintained by narrow pillars at the upper and lower borders. The margins of the cavity were extensively trimmed and fibrin foam inserted in the cavity. The wound was then closed in layers. Post-operative recovery was uneventful.

Pathologist's Report (Professor J. R. H. Kramer)

"Micro. The jaw lesion consists of a loose textured tissue composed mainly of cells with rather large, pale vermiform nuclei and indistinct sometimes granular cytoplasm. Some of these cells show marked phagocytic activity and there is a moderate number of multinucleate forms. The tissue contains diffuse and focal infiltrations of eosinophils together with many areas of necrosis and of haemorrhage. Although not typical the general appearances are those of an eosinophilic granuloma."

In view of these findings further investigations were carried out as follows:

1. X-ray examination of skull, chest and femurs. No lesions seen.
2. Differential Blood Count:

Polymorphs	64	
Lymphocytes	20	Film: Cell morphology appears normal
Monocytes	10	Platelets present
Eosinophils	4	
Basophils	2	

Direct Eosinophil count 300 per cmm.

The patient was finally discharged from hospital on 12th February, 1962, and the case was reviewed on 17th March, 1962, with satisfactory results.

ACKNOWLEDGMENT

We wish to thank Surgeon Rear Admiral D. D. Steele Perkins, C.B., C.V.O., Q.H.S., F.R.C.S., F.R.A.C.S., D.L.O., for permission to publish this article.

ACCIDENTAL POISONING WITH CARBON TETRACHLORIDE

By Surgeon Commander J. M. CLIFF, R.N

Carbon tetrachloride has long been used as an anthelmintic against tapeworms and hookworms although it has more recently been superseded by less toxic preparations

Accidental poisoning with carbon tetrachloride has been a frequent occurrence in industry and after the use of a fire extinguisher. Dudley (1935) reported on a toxic nephritis in four sailors after exposure to fire extinguishers. Partenheimer and Citron (1952) reported on the case of a man who was cleaning machinery with carbon tetrachloride, another who was exposed to the fumes of carbon tetrachloride, a third who accidently ingested several ounces of carbon tetrachloride and a fourth who was cleaning clothes with carbon tetrachloride in an enclosed room over a period of two hours

Case No 1

A 22 year old man was admitted to hospital on the 1st October 1956 with a history of vomiting and diarrhœa since 27th September, 1956. He subsequently admitted that he had drunk about six pints of draught cider on the evening of 27th September 1956–and later, while cleaning his suit in a large airy space with "Thawpit" he drank a small quantity certainly less than two drachms. On 28th September, 1956 he experienced abdominal pain, diarrhœa and vomiting which persisted until he reported sick on 29th September 1956. At first a diagnosis of simple gastro-enteritis was made and he was treated accordingly until he admitted his history of drinking carbon tetrachloride. On admission he complained of central abdominal pain with persisting vomiting and had only passed a small quantity of urine on one occasion during the previous 12 hours

Past History. No serious illnesses

Family History. Nil relevant

Habits. Smoked 20 cigarettes a day and usually took his tot of an eighth of a pint of rum and six pints of beer or cider daily

On examination on 1st October 1956 he was a well built man in no distress slightly drowsy but rational and co-operative. The tongue was coated but moist. Conjunctivæ were suffused. B.P. 110/40 and heart normal. Though there was tenderness beneath the right costal margin the liver was not palpably enlarged. Nothing else abnormal was found. On 2nd October, 1956, there was an icteric tinge to the sclerae and skin and the liver was now both palpable and tender. He was treated with Aureomycin 500 mgms. q.d.s. and Parentrovite 10 ml. b.d. intravenously with glucose drinks by mouth. During the following day there were several coffee-ground

vomits and bilateral subconjunctival haemorrhages appeared Nose bleeds were troublesome but the liver was no longer tender On 4th October there were paroxysmal hiccoughs and he passed a liquid bile-stained stool The liver was only just palpable and not tender The Aureomycin was discontinued On 5th October there were repeated coffee ground vomits with occasional hiccoughs and he was given two pints of 5 per cent glucose in normal saline intravenously Next day the vomiting persisted but the urine flow was now established (Figure 1) and hiccough was less frequent A further two pints of 5 per cent glucose saline was given By 7th October the vomiting was less frequent but the icterus was deeper and it increased on 8th October when he was given a further two pints of 5 per cent glucose saline On 9th October his appetite began to return on a carbohydrate diet although he continued to vomit occasionally There was little change until 11th October 1956 when there was gross asymptomatic haematuria. The jaundice persisted though the liver was not tender Haematuria persisted for a further three days

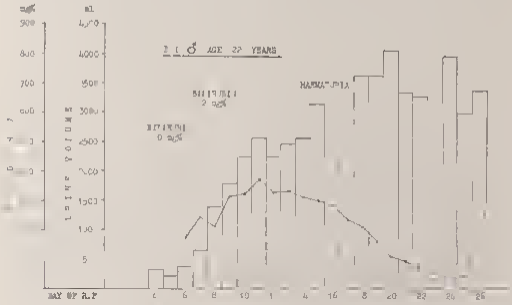


Figure 1 Changes in urine volume (□) and blood urea •—• in carbon tetrachloride poisoning

Liver function tests showed that on 2nd October 1956 the serum bilirubin was 10 mgms per cent with thymol turbidity 20 units and alkaline phosphatase 15 K A. units On 5th October 1956, they were respectively 12 mgms per cent 25 units and 10 K A units By 11th October 1956 the thymol turbidity had increased to 20 units but the alkaline phosphatase had fallen to 7 6 units The serum proteins and albumin/globulin ratio were within normal limits on 4th October and 18th October 1956 and the blood picture on 2nd October showed no significant abnormality with haemoglobin 112 per cent (16 57 grams per cent) E S R. 2 mms in one hour packed cell volume 41 per cent and white cell count 12 100 with 78 per cent polymorphs 9 per cent lymphocytes, 7 per cent monocytes and 6 per cent eosinophils

On admission the urine contained a cloud of albumin with ¼ per cent of sugar The deposit showed a moderate number of red cells white cells and granular and hyaline casts There was no sugar in the specimen on 5th October 1956 but the urine still contained albumin red cells and white cells with an occasional granular cast On 16th October 1956 there was again a ¼ per cent of sugar in the urine and this glycosuria persisted from time to time On 5th November 1956 a glucose tolerance test showed a very flat curve with a fasting level of 80 mgms per cent rising to 105 mgms per cent at half an hour and falling to 96 mgms per cent at 1 hour 66 mgms per cent at 1½ hours 76 mgms per cent at 2 hours and 64 mgms per cent at 2½ hours One specimen of urine contained a trace of sugar

His clinical course after 14th October was uneventful and the chart shows that there was a steady fall in the blood urea from about that time He was on sick leave from 19th November to 4th December, 1956 and on his return he was symptom free There was no jaundice the liver could not be palpated and the urine was free from albumin and deposit. Serum bilirubin was 0 2 mgms per cent, alkaline phosphatase 6 units and thymol turbidity 1 unit Blood urea was 26 mgms per cent serum protein 6.25 grams per cent with albumin 4.25 grams per cent and globulin 2 grams per cent Haemoglobin was 102 per cent (15 09 grams per cent) P C V 45 per cent E S R 14 mms in 1 hour The white cell count was 5 600 with 52 per cent polymorphs 45 per cent lymphocytes and 3 per cent monocytes

He returned to duty on 12th December 1956 and when re admitted for review on 2nd April, 1957, he stated that he had been entirely well apart from occasional upper abdominal cramps Contrary to instructions he had been drinking moderate quantities of beer His weight had increased to 155 lb and there were no abnormal physical signs Investigations showed the urine to be clear, direct Van den Bergh negative with serum bilirubin 0 2 mgms per cent blood urea 22 mgms per cent, alkaline phosphatase 6 units thymol turbidity nil serum protein was 7 5 grams per cent with albumin 5 grams per cent and globulin 2 5 grams per cent (A/G ratio 2/1) He returned to full duty on 11th April 1957

Case No 2

A 30-year-old photographer had long been in the habit of cleaning films with carbon tetrachloride in an enclosed space On 20th February 1960 he had a heavy drinking bout which continued until the early hours of 21st February 1960 During 21st February he was slightly nauseated but continued at work and cleaned films with carbon tetrachloride He then remained well until the morning of 24th February when he woke with stiffness in the shoulders and back and a frontal headache which increased during the day associated with much nausea On 25th February he was very nauseated complained of a great deal of malaise and was febrile (101 ½) His appetite remained poor his bowels were open normally but his urine became progressively dark from 24th February and its output fell

On admission to hospital on 27th February 1960 there was no definite jaundice and the liver was not palpable The urine however contained bile a heavy cloud of albumin and the deposit showed an occasional leucocyte and red cell Scleral icterus was evident on 28th February 1960 when the liver was just palpable

On 1st March 1960 his hæmoglobin was 115 per cent (17 02 grams per cent) E S R 2 mms in 1 hour P C V 50 per cent and white cell count 6 200 with 51 per cent polymorphs 47 per cent lymphocytes 1 per cent monocytes and 1 per cent eosinophiles Blood urea was 37 mgms per cent direct Van den Bergh positive serum bilirubin 6 4 mgms per cent alkaline phosphatase 8 K A units per cent thymol turbidity 7 units and thymol flocculation plus 4

His course in hospital was uneventful The albuminuria ceased by 7th March when the blood urea was 34 mgms per cent On 7th March the direct Van den Bergh was still positive the serum bilirubin 8 9 mgms per cent alkaline phosphatase 13 5 K A units per cent thymol turbidity 10 units thymol flocculation plus 4 serum proteins 9 3 grams per cent with albumin 5 2 grams per cent and globulin 4 1 grams per cent (A/G ratio—1/0 8) By 17th March 1960 the direct Van den Bergh was still positive but the serum bilirubin had fallen to 2 mgms per cent alkaline phosphatase 8 3 K A units per cent, thymol turbidity 10 units and thymol flocculation plus 4

After sick leave from 17th March to 28th March 1960 he was well and the urine was free from bile albumin and deposit On 31st March 1960 the serum bilirubin was 0 8 mgms per cent, alkaline phosphatase 10 5 K A units per cent thymol turbidity 8 units and thymol flocculation negative

He returned to duty on 1st April, 1960 and at review on 6th May 1960 he was again well His weight was steady there was no jaundice and the liver and spleen were not palpable Liver function tests showed a complete return to normal with the direct Van den Bergh negative serum bilirubin 0 3 mgms per cent alkaline phosphatase 6 units thymol turbidity 1 unit and thymol flocculation negative

Case No 3

A 56 year old man was admitted to hospital on 7th December 1960 in a comatose state On admission he was lying quietly in bed with his eyes closed and could only be roused by painful stimuli His breath was of unusual odour rather sweet and perhaps suggesting methylated spirits or carbon tetrachloride B P was 110/80 and heart normal The liver was easily palpable below the right costal margin abdominal reflexes absent The pupils were equal with a sluggish light reaction Knee jerks were equal with an unsustained left patella clonus ankle jerks also were equal and plantar responses not elicited

A primary diagnosis of simple alcoholism was made and the stomach was washed out shortly afterwards The contents of the stomach were slightly bile-stained with a trace of red blood but they did not have any unusual odour

He recovered consciousness during the night and on 8th December 1962 was alert and co operative He then stated that his usual alcohol habits were 2 or 3 bottles of beer a day although he had had occasional episodes of alcoholism in the past. For the week prior to admission he had begun to drink spirits heavily On 7th December 1960 he drank about half a bottle of spirit in the evening and then for some unknown reason he drank from a bottle of carbon tetrachloride kept at home for cleaning purposes

Past History No serious illnesses

On Examination (8th December 1960) There was a sweet smell around the bed The

patient was endeavouring with the oral mucous membrane pink His pulse was 84 and regular B P 120 80 and heart normal The liver was still palpable but not tender There were no abnormal neurological signs

He was treated at rest in bed with glucose drinks and from 9th December 1960 received aureomycin 500 mgms q d.s with parentrovite b d intramuscularly

The significant first feature of his course in hospital was the passing of repeated very blood-stained fluid stools These, however, became less frequent and less blood stained by 11th December 1960 His urine output (see Figure 2) fell to 1½ oz On 10th and 11th December there was only a trace during the previous 24 hours Scleral icterus appeared on 9th December and increased but the liver size remained unchanged and the liver was not tender

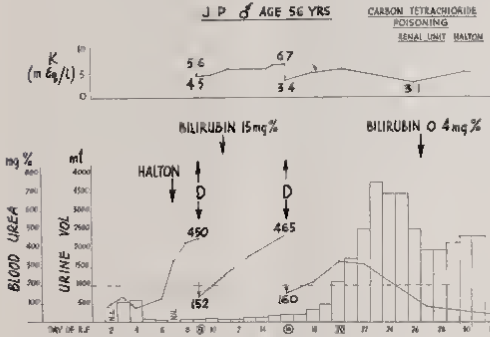


Figure 2. Changes in urine volume (⊓) and blood urea ⟶ in carbon tetrachloride poisoning

The urine contained frank blood on 8th December 1960 but on the following day there was a trace of albumin with scanty red cells and occasional leucocytes On 12th December a minimal quantity of urine contained a very heavy cloud of albumin with masses of red cells white cells and epithelial cells together with granular casts

On 8th December 1960 the haemoglobin was 112 per cent (16 5 grams per cent) P C V 50 per cent and E S R 6 mms in one hour White cell count was 13 000 with 80 per cent polymorphs 15 per cent lymphocytes 4 per cent monocytes and 1 per cent eosinophiles

Daily blood urea estimations on 8th 9th 10th 11th and 12th were respectively 100 140 75 125 and 130 mgms. per cent

On 8th December, 1960 the serum bilirubin was 4 7 mgms per cent alkaline phosphatase 7 5 K A units and thymol turbidity 1 unit while on 10th December 1960

the serum bilirubin had risen to 7·4 mgms. per cent and the alkaline phosphatase to 10·5 K.A. units per cent. The thymol turbidity was unchanged. On 10th December the serum proteins were 9 grams per cent with albumin 4·5 grams per cent and globulin 4·5 grams per cent.

Although his general condition remained excellent he had become almost anuric by 10th December and therefore arrangements were made for his transfer to a renal unit.

On 13th December 1960 his blood urea had risen to 340 mgms. per cent and then to 420 mgms. per cent on 14th December. Blood sugar was 116 mgms. per cent and serum cholesterol to 130 mgms. per cent. On 15th December the serum bilirubin was 12 mgms. per cent, alkaline phosphatase 3·6 K.A. units, but the thymol turbidity was 10 units and the thymol flocculation was positive.

In view of his continued almost complete anuria dialysis was carried out on 15th December, the blood urea falling from 450 mgms. per cent to 152 mgms. per cent.

The urine flow (see Figure 2) was not established and on 21st December 1960 the blood urea had risen to 420 mgms. per cent. On 22nd December 1960 the dialysis was repeated, the blood urea falling from 465 mgms. per cent to 160 mgms. per cent. Diuresis commenced on 26th December 1960 with a urinary output of 1,150 mls. and from that time his course was uneventful.

By 30th December 1960 the serum bilirubin had fallen to 1·8 mgms. per cent and the alkaline phosphatase to 10 K.A. units per cent. His urine volume was then over 3 litres per day and the blood urea had begun to fall. By 12th January 1961 the serum bilirubin was 0·7 mgms. per cent, alkaline phosphatase 9 K.A. units, thymol turbidity 7 units and thymol flocculation negative. He was then ambulant and was in fact discharged from hospital to sick leave on 18th January 1961, finally returning to full duty.

Discussion

In the literature there are scattered references to the apparent potentiation of the effects of carbon tetrachloride by alcohol but this fact does not appear to have been stressed. Smillie and Pessoa (1923) mentioned two cases in which therapeutic quantities of carbon tetrachloride were given for treatment of hookworm disease and a considerable constitutional upset occurred. Both patients had consumed quantities of alcohol just before they had received their vermifuge. Smith and Cook (1934) gave details of a man aged 50 who received 4 c.c. carbon tetrachloride by mouth for treatment of Ankylostomiasis and following a collapse about 2½ hours later was given brandy. He died after 27 hours and the post mortem showed a necrosis of the liver with fatty degeneration of the kidneys and liver. Smetana (1939) came to the conclusion that alcohol certainly played a part in some cases of carbon tetrachloride poisoning although many cases did not depend upon alcoholism. Three of McGill's (1946) cases had a heavy exposure to carbon tetrachloride fumes... the abstainer from alcohol survived as did one intermittent heavy drinker who had not recently taken alcohol while another heavy drinker died. One of Woods's (1946) 3 cases had a reputation of being a heavy drinker and of Moon's (1950) 12 cases 11 were stated to be acute or chronic alcoholics and 6 were intoxicated at the time that they either ingested or inhaled carbon

tetrachloride Moon suggested that there was a synergistic nephrotoxic effect between alcohol and carbon tetrachloride Four out of five reported by Partenheimer and Citron (1952) took quantities of alcohol just before after exposure to carbon tetrachloride fumes or accidental ingestion Myatt and Salmons (1952) found that 15 cases of carbon tetrachloride poisoning had been admitted to the U S Public Health Service Hospital in San Francisco between January 1948 and May 1951 giving an admission rate of 1/1,000 Thirteen out of 15 had a history of taking alcohol before or during exposure to carbon tetrachloride and of the three deaths one had been drinking moderately and two heavily Guild Young and Merrill (1958) studied 20 cases of carbon tetrachloride poisoning admitted to the Peter Bent Brigham Hospital between 1948 and 1957 16 of these had taken large quantities of alcohol for months or years and 14 of the 16 took alcohol shortly before during or after exposure to carbon tetrachloride

Lamson Gardner Gustafson, McClean and Wells (1923) found that alcohol greatly increased the toxicity of carbon tetrachloride in animal experiments but Wells (1925) could not show any increase in rate of absorption of carbon tetrachloride unless it was taken with very high concentrations of alcohol Carbon tetrachloride is soluble in alcohol and in inhalation poisoning alcohol is also being excreted by the lungs There is some animal work (Merrill 1955) to indicate that carbon tetrachloride is directly injurious to the capillaries This may account for a very frequent occurrence of a haemorrhagic broncho-pneumonia but the main effect is on the liver and kidneys where Kirkpatrick and Sutherland (1956) found at autopsy eight days after a mitral injury a centrilobular zonal necrosis of the liver with evidence of early regeneration of the parenchymal cells Sections of the kidneys showed a lower nephron nephrosis with active epithelial regeneration suggesting that the recovery phase had started

Summary

Three cases of accidental carbon tetrachloride poisoning are reported one being treated with renal dialysis The potentiation of carbon tetrachloride by alcohol is stressed

ACKNOWLEDGMENT

I am grateful to Air Commodore R C Jackson (1962) who reported Case 3, and for the loan of Figure 2.

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SMITH S and COOK W G (1934) Taylor's Principles and Practice of Medical Jurisprudence Vol 2, page 631
WELLS H S (1925) *J Pharmacol exp Ther* **25** 235
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AN UNUSUAL PROBLEM OF CONTACT LENSES

By Surgeon Commander P D A. DURHAM, R N

The patient W D a young able seaman aged 21 years was referred for consultation to the Royal Naval Hospital Malta on 31st August 1962 because a recent PULHEEM examination had shown him to have defective vision The accompanying report stated that the rating had blandly admitted that he was in the habit of using contact lenses The history he gave was interesting He stated that at the age of 16 years he was serving in the Merchant Navy when he developed a longing to join the Royal Navy He realized that his distance vision was poor and would in all probability fail him for the seaman branch However he was not to be deterred so easily and on his own initiative was fitted with a pair of full haptic contact lenses from a London firm of opticians These incidentally cost him about £40 the payment for which he effected on deferred credit terms

In 1958 he applied to join the Royal Navy and was passed visually fit for entry in the seaman branch at an unnamed Royal Naval recruiting centre Subsequently he reported to a naval establishment where he was again successful in passing his initial medical examination After his training was successfully completed he went on to ordinary seaman and was eventually rated able seaman The matter came to light in a seagoing draft because he was told to report to the sick bay at short notice for a purely fortuitous PULHEEM and unaware of the proposed examination had failed to take the seamanlike precaution of having his contact lenses to hand

On examination at hospital his visual acuity was found to be as follows

Right unaided 6/18 correcting to 6/9 plus with minus 2 5 spheres
Left unaided 6/60 correcting to 6/9 plus with minus 2 75 spheres
Binocularly he read 6/6 with ease

The patient stated that he could tolerate his contact lenses with ease for a full four hour watch and that he could carry out his duties without difficulty or reprimand The contact lenses incidentally, had not been repolished since original purchase The question of what to do was resolved by suggesting that the problem should be referred through the normal executive channels to the Admiralty for a decision quoting the clinical findings with an accompanying executive report on his efficiency with the additional information that the rating himself was very keen to be allowed to continue to serve as an able seaman The matter remains *sub judice*

The permission of the Medical Director General of the Navy to report this case is gratefully acknowledged

Reviews

BIOMETEOROLOGY [illegible] International Biometeorological Congress held in [illegible] by S W Tromp [illegible] Oxford Pergamon Press [illegible]

It is difficult to [illegible] comprehensive volume [illegible] the specialist in [illegible] seeking general knowledge [illegible] which are not the [illegible] and still in some way [illegible] biometeorology receives a rational [illegible] in their particular [illegible] of course true there is ghost than pure science [illegible] has small initial outlay

Quite as impressive [illegible] is the list of persons attending the Congress amongst whom are to be found physicians physiologists engineers biologists climatologists [illegible] and indeed representatives [illegible] discipline connected with living things

Of special interest [illegible] and unless in the sensation and fatigue of the [illegible] is given that intermittent exposure [illegible] relatively simple and has a sedative and pain relieving quality which may be valuable as a preventive treatment There is also a suggestion that positively ionized air may increase the oxygen uptake during exercise

Another paper of [illegible] describes normal experiments showing various effects on rate of movement of the tracheal [illegible] in media of both positively and negatively charged oxygen and carbon dioxide

There seems little doubt that in spite of much controversy that serious attention must be given to the problem of [illegible] atmosphere especially in those circumstances where man must work in confined spaces

It is not possible within the limits of this review to do justice to so extensive a work which must become a standard reference [illegible] biometeorology It is difficult to be sure just where biometeorology should be placed in the [illegible] of the sciences It does however represent a step forward in that it breaks down some of the barriers which tend to confine the more basic sciences in water tight compartments It is stimulating refreshing and chilling work

S M

TRANSPLANTATION (Ciba Foundation Symposium) Edited by G E W Wolstenholme *O B E* M A M B M R C P and Margaret P Cameron M A Pp xiii 426 Seventy one illustrations London J A Churchill Ltd Price 35s.

This symposium organized by the Ciba Foundation on topics of current interest affords an opportunity for valuable exchange of views and review of progress Publication of the proceedings of these symposia means that all can share the experience The Editors and Publishers are to be congratulated on the production of this volume within a year of the event There were 29 participants in this symposium on transplantation of whom over half were from abroad This 16 papers which were read and the succeeding discussions [illegible] amounting to one quarter of the total making up this volume

Transplantation is a topic of interest to all when it offers the hope of spare parts service to man equivalent to that which he expects for his machinery The subject can be divided into two parts that part already a clinical practice where the current framework is transplanted from one individual to another e g bone aorta and other vascular tissue and the recipient uses the framework for repopulation by his own tissue cells or skin where after extensive burns only temporary cover is acceptable. On the other hand successful transplantation of living tissue e g kidney and bone marrow from one person to another is only possible unless they are identical twins after suppression of the immune response. Exemptions to this rule are certain privileged sites such as the cornea of the eye It is towards an understanding of the immune mechanism and of its manipulation tolerance which can be induced in [illegible] animals that so much work is at present directed It is hoped that means will be found which will permit this kind of transplantation of functional tissue without involving the present [illegible] immunities which result from whole-body penetrating radiation or cytotoxic drugs or transfusion at birth from the prospective specific donor This binding volume in this field of research report and discuss their findings which have now reached a point where they make useful or risky reading for anyone with a general interest in the subject

D W H B

BUTTERWORTHS INDEX OF TREATMENT Pp 464 London Butterworth & Co Price 50s

This small handy book which can easily be kept in the pocket is particularly useful for general practitioners and house officers As the publishers say it is designed to give rapid reference to the essentials of treatment of a large number of diseases and conditions and covers many aspects of medical practice It is arranged alphabetically starting with Abdominal Emergencies and ending with Zinc Phosphide Poisoning

Synonyms and alternative [illegible] noted in their correct alphabetical order with reference to the main title. There are numerous references. The limitations of a book of this kind [illegible] be expected and rare conditions of all kinds of surgery and highly specialized treatments are excluded. Nevertheless the amount of material packed into the 464 pages is immeasurable. For a book of this value the price is too high to be obtainable due to the beautiful attractive cover and binding which of course is an advantage in a hard reference pocket book

C W J U

Clinical Endocrinology. By Lawrence Martin M D F R C P. Third edition. Pp viii + 275. Forty-eight blank and white illustrations. London: J & A Churchill Ltd. Price 28s

This third edition of this book which is primarily for the general physician but gives a rapidly advancing subject up to date. As previously it is a concise and practical account of endocrinology.

There are ten chapters covering all the endocrine glands. The second chapter is devoted to the increasingly important subject of obesity and deals in only seven pages is most comprehensive. The references for further reading are also excellent. There is a new chapter on Human Sexual Development to cover the new avenue of investigation and elucidation of abnormal sexual and genital states. The text is plain and easy to follow. References for wider reading are grouped at the end of major sections in the longer chapters for convenience. The illustrations so important in a subject such as this are excellent and quite adequate. The subject matter stresses the clinical aspect without involving the reader in too much biochemistry and pharmacology.

This book is well bound printed on glossy paper and reasonably priced. It is now deservedly a standard textbook for practitioners and student and is to be recommended

C W J U

Local Analgesia Abdominal Surgery. By Sir Robert Macintosh and R. Bryce-Smith. Second edition. Pp viii + 82. Many blank and white and coloured plates. London & Edinburgh: E. & S. Livingstone Ltd. Price. 25s

This small book might well be thought expensive for its size, but to the clarity of its many diagrams with the minimum of concise text there is produced a very practical and easily understood new edition. There are 91 diagrams in its 82 pages.

The contents are divided mainly into two parts: anatomy and techniques the one following logically on the other with a short but practical discussion on indications for local analgesia and drugs available. In this second edition two additional techniques are included namely presacral neurolysis and pyloromyotomy in infants.

To sum up a very useful and easily read addition to the list of books on local analgesia

R W B P

Casualty Officers Handbook. By Maurice Ellis M A B M B Ch (Cantab) F R C S (Eng) F R C P D T M & H. Pp viii+242. Many illustrations. London: Butterworth & Co. Price 42s – 2s postage.

This book is the written expression of the verbal instruction which has been given by the author to students and junior casualty officers at the Leeds General Infirmary over the past ten years. It was designed by him to guide his housemen both in the diagnosis and treatment of the many complex and worrying problems which they may have to face in the casualty department.

The can be few other posts in which the newly qualified resident may find himself with so much responsibility but so little immediate supervision. He has to learn quickly to assess the seriousness of the patient's symptoms knowing when to admit the patient for observation when to call the surgeon and when he can be sent home safely under the care of the private practitioner. This knowledge comes with experience which unfortunately passing. Finals does not prevent this a reference book which can to some extent embody that of the author is doubly welcome.

The general format of the book is good and the explanations clear. The illustrations are particularly helpful but in a few instances are not as demonstrative as the text would imply. The importance of making good notes at the time of the examination is rightly stressed—not only from a point of view of good clinical practice but as a safeguard against possible medico-legal complications. The *pro forma* schemes for history taking are especially valuable with their additional details of the history are not likely to be omitted, especially if the department is busy so the resident has been dragged from his bed!

In short there is here a wealth of clinical experience set down in a concise form which remains readable

J J E

Halothane. By C. Ronald Stephen B Sc M D, C M and David M. Little Jr. M D. Pp viii + 142. Fourteen figures. London: Baillière Tindall & Cox Ltd. Price 48s + 2s 9d post age

This monograph is by two authors not as they point out because the extent of the subject demands wide coverage, but to obtain to provide a balanced view of an anaesthetic drug which still arouses widely different opinions. In addition a third author Dr. J. P. Payan of the Department of Anesthesia Post-Graduate Med cal School has contributed a report on the position of Halothane in British anaesthetic practice.

It is a well produced book easy to read and non-controversial. Its main use will be for those taking a higher qualification in anaesthesia who will find its extensive collection of references (338) of value though the book itself is rather expensive

A. O'C

TREVES' SURGICAL APPLIED ANATOMY. Revised by Lambert Charles Rogers, *C.B.E.*, V.R.D., M.Sc., M.D., M.Ch., F.R.C.S., F.R.C.S.E., F.R.A.C.S., F.A.C.S. Fourteenth edition. Pp. x + 508. 202 illustrations. London: Cassell & Co. Ltd. Price 35s.

I will praise thee for I am fearfully and wonderfully made. (Psalm CXXXIX. 14.)

Frederick Treves was born in 1853 and at the age of 31 was appointed surgeon in the London Hospital. He was responsible for many books besides this anatomy textbook. His most successful in the heyday he was one of the best known London surgeons and operated on King Edward VII draining an appendix abscess with two tubes.

He was a man of many interests and travelled widely navigating his own yacht *Legabaud*. He loved the sea and one of his sayings was "A surgeon's hands must be delicate but they must be strong. He needs a jeweller's fingers and a seaman's grip."

This fourteenth edition of the book is the last of five revisions undertaken by Lambert Charles Rogers and was completed just prior to his untimely death. A feature of this edition is the section on the review of the chest and its viscera reflecting the modern surgical developments in this region.

In Cassell's familiar handbook mould this edition of nearly 600 pages is beyond reproach for the clear, concise layout with plenty of neat, precise illustrations. In his first edition Treves wrote that "The student of anatomy may be conscious that the study is a valuable if somewhat unexciting mental exercise. The accumulation of hard, unassimilable facts. It should be the object of Applied Anatomy to invest these facts with the circumstances of daily life, to make the dry bones live!"

These precepts are fully achieved and it would seem almost impertinent to recommend it. It is a classic.

K. T. H.

FABER'S ANATOMICAL ATLAS. By I. M. Bardinn, M.B., Ch.B., F.R.C.S. (Edin.) and S. Macdonald, S.R.N. Revised by J. McKenzie, M.D. Plates by A. K. Maxwell. Fourth edition. Pp. 62. Twenty-eight plates. London: Faber & Faber Ltd. Price 10s. 6d.

The anatomical diagrams are excellent, being clear and concise. The selection of plates covers the essential features required. The neglected eye test is very simple and should prove helpful to first aid workers and nurses, but is considered too elementary for the other professions mentioned. It is unfortunate only in so recent an edition that the metric system has not been adopted throughout the text.

J. S.

HOSPITAL INFECTION—CAUSES AND PREVENTION. By R. E. O. Williams, M.D., M.R.C.P., R. Blowers, M.D., L.R.C.P. and R.C.P., and R. A. Shooter, M.D. Pp. x + 307. London: Lloyd-Luke (Medical Books) Ltd. Price 35s.

Many books and papers have been written on this subject, all interesting and arising from sound research, but most tending to leave the reader wondering where it all got him. This book, however, has behind it the combined authority of four authors who are able to correlate and add information useful to all branches of modern medicine curative, preventive and administrative alike.

Hospital infection on the whole tends to be regarded as a bogey by the profession in general. This very readable book can do much to enlighten this attitude and emphasizes how cautious one must be in making specific recommendation in a realm which enigmatically becomes more complicated with every advance in medicine. A book well worth its 35s.

P. B. N.

ANAESTHETIC ACCIDENTS. By V. Keating, M.B., B.Ch., D.A., F.F.A.R.C.S. Second edition. Pp. viii + 288. London: Lloyd-Luke (Medical Books) Ltd. Price 28s.

This is a well set out and lucidly written book on what appears to be all the significant complications met in anaesthetic practice. Prevention, diagnosis and treatment are dealt with together with the reasoning behind the clinical management.

This book should be of considerable value to all trainee anaesthetists and find a permanent place as a work of reference. House officers would also do well to read it.

J. C.

FUNDAMENTAL TECHNIQUES OF PLASTIC SURGERY AND THEIR SURGICAL APPLICATIONS. By Ian A. McGregor, M.B., F.R.C.S. (Eng.), F.R.F.P.S. (Glas.). Second edition. Pp. x + 286. Many black and white photographs and illustrations. London and Edinburgh: E. & S. Livingstone Ltd. Price 32s. 6d. net; 4d. postage.

Like the first edition this small volume will add to the armamentarium of any surgeon who has to face reparative problems without any previous practical experience in this branch of surgery. It has the merit of being readable and brief and yet contains a vast amount of useful detail and in particular the essential principles of technique.

The addition of a chapter on maxillo-facial injuries helps to complete the overall picture and with the increase in road accidents should prove invaluable to duty surgeons.

The author's clearly condensing his knowledge and experience to a minimum and the book might well be improved with more detailed accounts of techniques at the expense of a few extra pages.

This is unquestionably a volume which should be added to the library of any surgeon likely to treat the consequences of trauma and should certainly prove most valuable to naval surgeons.

E. H. M.

[illegible] Diseases. Treatment of Prevalent Diseases. *By* Frederick Wright M.A., M.D. [illegible] F.R.C.P. (Edin.), D.T.M. & H. (Eng.) and J. C. Gould M.D. [illegible] 47 with photographs and illustrations. London: Oxford University Press. [illegible] Price [illegible]

This [illegible] should form one of the series of Oxford Handbooks for Medical Auxiliaries should [illegible] medical officer from including it on his bookshelf. It should certainly find a place in [illegible] Unqualified medical assistant to take the place of doctors in dispensaries or small hospitals.

Clear [illegible] is a straightforward text simplify the problems of differential diagnosis in the tropics [illegible] the adage that common things occur commonly. Parts 2 and 3 include brief descriptions [illegible] diseases diagnosed and favoured drugs whilst Part 4 gives a simple system of [illegible] in the tropics.

The [illegible] provide an easy ready reference or revision of diagnosis and treatment in the tropics.

W. R. D.

Price's Surgery. Thirty-Six Edition. Volume II. Edited by Hamilton Bailey with the assistance of James Kyle. Pp. 440. Illustrations 453. Bristol: John Wright & Sons Ltd. Price 40s.

Although the previous editor, Hamilton Bailey, died when he had barely started work on revision of the second volume of this now-standard textbook his high editorial standards wishes and designs had been well by his successor. It is worthwhile therefore to quote in part the scope and purpose [illegible] which was outlined in its preface. "Volume II is intended for the long practitioner who must know how to perform minor operations and be able to deal with a wide variety of surgical emergencies."

There can hardly be anyone in the present practice of British medicine to whom this description applies more closely than to the ship's medical officer. The question left to the reviewer then is to ascertain whether or not the book lives up to its stated intent on? In his opinion the answer is whole heartedly Yes.

Some 43 chapters by 34 authors provide a comprehensive statement of special and some general surgical technique linked the upstanding eye over the fringes of surgery by inclusion of such subjects as an enthusiast [illegible] sense in his [illegible] illness and various medico legal matters.

However [illegible] completeness of this volume one would like to see included in the wide range of [illegible] sections on [illegible] comprehensive account of local anaesthesia (e.g. as it might be applied by [illegible] to smear of the less trained orthopaedic or general surgical operations and of the value in [illegible] of sedatives tests for anti tetanus serum topical cocaine etc.

One point of detail with [illegible] complete variance from current naval practice has been detected namely the recommendation [illegible] Eustachian catheterization or myringotomy for sero-otis. Extensive experience in the Navy [illegible] barotrauma in conditions in divers submariners and aviators has led to our adoption of a very much more conservative line of treatment.

The above points detract but little from the general value of the book though and it should prove to be an invaluable guide to general practitioners and in most specialist but relatively junior hospital staff. Its usefulness to medical officers in the Armed Services is obvious from first glance and when next in a sea appointment the reviewer [illegible] one will cause it to be essential to take with him his own personal copy.

R. R. A. C.

Practical Therapeutics. *By* H. J. B. Galbraith M.D., M.R.C.P., J. Q. Matthias M.B., M.R.C.P., F.F.A.R.C.S. and R. C. King M.D., M.R.C.P. Pp. vii + 446. London: Lloyd-Luke (Medical Books) Ltd. Price 35s.

A book on practical therapeutics is always welcome and when it is as well thought out and carefully arranged as that of Galbraith, Matthias and King it becomes an indispensable book of reference for the busy clinician. It breaks away from the conventional approach of its predecessors and spends a considerable number of pages giving useful information about the many problems which today are proving of growing interest and importance. To name just a few of these at random, there are chapters devoted to drugs affecting mood, obesity, electrolyte and acid base balance, the hemidepolette system parasitic worms and finally corns and poisoning. The various subjects are all discussed to appreciate as a result of the valuable earlier chapters which give in a simple way the fundamental principles of treatment using single and combined drugs and also the physical and dietetic aspects of treatment. The list of antibiotics that follows is up to date and comprehensive and the well-tried sulphonamides are stressed.

As a general purpose reference book this can be highly recommended.

S. M.

Inhaled Particles and Vapours. Proceedings of an International Symposium organized by the British Occupational Hygiene Society, Oxford, 29th March—1st April, 1960. Edited by C. N. Davies. Oxford: Pergamon Press. Price £5.

Inhalation of foreign substances into the human lung has assumed the greatest importance in preventative, curative and Service medicine. The Proceedings of an International Symposium on

Inhalnt Particles and Vapours therefore form a valuable book of reference for naval medical officers

One is able to dip in its pages for the latest theories and practical experience on respiratory physiology and anatomy, the physical and chemical aspects of particle retention, the radio active aerosols, vapours and particle exposure interactions, pulmonary elimination and storage of dust, asbestosis, selective sampling and pneumoconiosis.

W. R. D.

OPHTHALMOLOGY IN THE TROPICS. By J. J. Somerset, M.B., D.O.M.S., M.S. (Lond.). Pp. viii + 171. Many coloured plates and black and white photographs. London: Bailliere, Tindall and Cox Ltd. Price 40s.

This book, which again shows the present tendency in tropical medicine for a minimum approach to the various problems to be met, is indeed most welcome. It brings home to the reader the great importance of ophthalmic conditions in tropical medical practice, and it is again surprising to read of the variety of conditions in which they appear in addition to major tropical ophthalmias, illnesses such as trachoma and ocular myiasis.

The illustrations and descriptions of eye changes in vitamin deficiencies are a reminder of the extensive ocular disability which was found in prisoners of war rehabilitated from Japanese camps in 1945 and are a timely warning of the importance of dietetic care in backward communities.

The book is of a convenient size well produced, comprehensive and well worth the modest price of 40s.

S. M.

UNDERWATER MEDICINE. By Surgeon Captain Stanley Miles, M.D., M.Sc., D.T.M. & H., R.N. Pp. 328. Sixty illustrations. London: Staples Press. Price 60s.

As the author of this book is the Editor of this JOURNAL, readers may suspect a certain bias in the review. It is intended therefore, simply to state the objects and aims which stimulated the writing of the book.

It had been apparent for many years that in the subject of underwater medicine there was no single volume which brought together all the various studies which had been made in this field. It was also apparent that the wide spread interest in underwater activities which had developed in recent years demanded some attention. Consequently this book approaches the subject as a compromise between an extremely technical treatment and a non-scientific one. The greatest need is for those doctors who in some way or another are associated with underwater activity either themselves or through their patients.

The first four chapters of the book review the physical and physiological environments and emphasize the importance of studying each aspect. Following this these chapters go through the hazards of the environmental subject by subject and conclude with a series of typical underwater incidents and an up to date presentation of current thought on drowning. The final section of seven chapters attempts to show how man can adapt himself to the underwater environment and usefully profit by all it has to offer. Special attention is given to water safety, selection, training and underwater equipment. Finally the special problems of the submarine and submarine escape are discussed from a historical and practical aspect. The last chapter in the book is devoted to an elementary discussion on marine animals as a vast subject in itself, on which only a slight factual treatment is possible.

The only adverse comment which the writer wishes to make is that the price 60s. is possibly excessive. It is hoped that this will not prevent readers who might have benefited by the book from purchasing it. Perhaps one day a cheaper edition will be available.

S. M.

TYPHOID FEVER AND OTHER SALMONELLA INFECTIONS. By R. L. Hunkin, M.A., M.D. (Cantab.), F.R.C.S. (Edin.), F.R.C.S. (Eng.). Pp. xi + 334. Many blank and white illustrations and photographs. London and Edinburgh: E. & S. Livingstone Ltd. Price £2 2s.

Typhoid fever like the poor is always with us and this compact little volume with its friendly presentation with many human touches as well as factual illustrations makes refreshing reading. All aspects of the disease are efficiently covered, general features, diagnosis, prophylactics, treatment, complications and specific problems, all the secondary findings which fall within logical sequence and leave no loop-holes in the narrative.

As a handbook for both the practitioner and the specialist in preventive medicine it is highly recommended and the various appendices which embody not only those in themselves are of the utmost value. The summary which includes the meat of the preceding chapters into nine pages is a masterpiece.

S. M.

PRINCIPLES OF THE TREATMENT IN TRAUMA. By Mr. W. H. Kirkaldy-Willis and Mr. A. Michael Wood. Pp. xi + 243. Many diagrams and black and white photographs. London and Edinburgh: E. & S. Livingstone. Price 24s. 2s. 3d. postage.

The authors have tried to impress the basic principles of traumatic surgery into 240 pages. As a result there is a great deal in the book but of necessity many hints had to be omitted. There is no padding in the book and to attempt to summarize its many points and finer balance into 12 pages is indeed hard work. In spite of this, the book is very readable and well illustrated and there are excellent many diagrams. This result is an excellent volume for students, housemen and those

who have become skilled in their trade but tend to forget those early basic tactics. All surgeons may not agree with some of the methods of treatment but the emphasis is on early mobilization and restoration of function, both of which factors are extremely important in the Royal Navy. It is felt that this volume would be a good acquisition for the trainee surgeon and for the medical officer on board a ship.

M J B

ORAL SURGERY FOR NURSES. By F. G. Hardman, M.B., Ch.B., B.D.S. (Manc.), F.D.S., R.C.S. (Eng.), M.R.C.S. (Eng.), L.R.C.P. (Lond.). Pp. 112. Black and white photographs and illustrations. Bristol: John Wright and Sons Limited. Price 15s.

Dr. Johnson once remarked that being about to be hanged concentrated a man's mind most marvellously. The same applies to writing a small book about a large subject. It is a pleasure to come across one like this, containing everything that could be wished for within the terms of its title, sensibly arranged and lucidly told with little or nothing that could have been left out except to its detriment.

Oral Surgery for Nurses is intended to bridge the gap that too often lies between the surgery and the theatre and between both of these and the ward.

After a swift review of the special anatomical considerations involved it gives a short outline of the content of oral surgery in general with brief and often sagacious comments on the various types of operations as they occur. This section contains an account of the instruments required on the trolley for each case.

Part 3 is devoted to the patient's admission, pre- and post-operative care, and nursing in the ward. It embraces the special problems involved in nursing patients who are denied the full use of their jaws, feeding and dietary schemes, and the hazards that accompany loss of muscular competence at the back of the mouth.

There is a valuable section here on dangerous reactions to sulphonamides and antibiotics contributed by Professor A. Kekwick.

The illustrated appendix of instruments used will be of particular value to theatre staff who are unfamiliar with some dental instruments that may be brought in from the surgery.

The book is matter of fact, laconic and very professional. It carries the marks of much routine experience and could well be read to advantage by others than nurses. It is well printed on good paper and profusely illustrated. It deserves a better cover.

W E S

We acknowledge with thanks receipt of the following publications:

Acta Medica et Biologica. *Annales Medicinae Internae Fenniae*. *Annalich Medicine Navale*. *Australian Journal of Experimental Biology and Medical Science*. *Archivum and New Zealand Journal of Surgery*. *British Journal of Surgery*. *British Medical Bulletin*. *British Medical Journal*. *B.S.I. News*. *Broadway Bulletin of The World Health Organization*. *Fukushima Journal of Medical Science*. *Ghana Journal of Medical Sciences*. *Guy's Hospital Gazette*. *International Review of the Army, Navy and Air Forces Medical Services*. *Journal of the Irish Medical Association*. *Journal of the R.N. Sweatshe Service*. *Kyushu Journal of Medical Science*. *Kumamoto Medical Journal*. *La Medicina de Reserve*. *Medico Feuneo*. *Medical Digest*. *Middlesex Hospital Journal*. *Militari Medicine*. *Rafua Di Medicina Aeronautica E Spaziale*. *Revista Medica*. *Revista Medico del Hospital Colonia*. *Proceedings of the Staff Meetings of The Mayo Clinic*. *Sonderdruck Tierarztliches Arkakundschau*. *St. Thomas's Hospital Gazette*. *St. Mary's Hospital Gazette*. *Texas Reports on Biology and Medicine*. *Tohoku Journal of Experimental Medicine*. *Tropical Diseases Bulletin*. *Vestnik dermatologii i Venerologii*. *W.H.O. Chronicle*. *Yokohama Medical Bulletin*. *Yonago Acta Medica*.

News of the Service

OBITUARIES

Surgeon Captain E L MARKHAM *O B E* M B B S died on the 1st December 1962 at the age of 79 years He qualified M B, B S in the University of Durham in 1908 and entered the Royal Naval Medical Service on the 6th May 1910 as Surgeon Lieutenant He was promoted Surgeon Lieutenant-Commander on 6th May 1910 and Surgeon Commander on 6th May 1922

Captain Markham was awarded the O B E (Military Div) on 27th June, 1919 (*London Gazette*) for valuable services in H M S *Carnatic* 8th Light Cruiser Squadron

He was placed on the Retired List (Own Request) with rank of Surgeon Captain on the 19th October 1938

Surgeon Captain S H WOODS, *O B E* M D F R C S (Eng) died on the 22nd September, 1962, at the age of 90 years He qualified M B B S (1899) and entered the Royal Naval Medical Service on 15th May 1899 as a Surgeon He was promoted Staff Surgeon on the 15th May 1907 and Surgeon Commander on the 15th May 1913 He qualified as F R C S (Eng.) in 1923 and was awarded the O B E (*London Gazette*) on 7th June 1918

He was placed on the Retired List (Age) with the rank of Surgeon Captain on the 11th February 1923

Surgeon Captain A G MALCOLM M B B S died on 29th September 1962, at the age of 78 years He qualified M B B S in 1908 and entered the Royal Naval Medical Service on 14th May 1909 as a Surgeon Lieutenant and promoted to Surgeon Lieutenant-Commander on 14th May 1913 and to Surgeon Commander on 14th May 1921 He was placed on the Retired List (Own Request) with rank of Surgeon Captain on the 15th May 1939

Surgeon Captain R J INMAN M B B Ch died on the 6th October 1962 He was born on 13th August 1869

He entered the Royal Naval Medical Service on 15th July 1915 as a Surgeon Lieutenant promoted to Surgeon Lieutenant Commander on 15th July 1920 and to Surgeon Commander on 15th July 1926 He was placed on the Retired List (Age) with the rank of Surgeon Captain on 15th January 1940

Miss Annabella RALPH *C B E* R R C died on the 20th June 1962 at the age of 78 She trained at the Aberdeen Royal Infirmary and entered the Q A R N N S on 25th September 1915 In 1935 she became Matron and served at the naval hospitals Hong Kong Haslar Plymouth and Malta and was appointed Matron-in-Chief in 1940 and served at R N Hospital Haslar until 1941

Miss Ralph retired in 1941 and then rejoined in January 1942 She served as Matron at Kilmacolm from 1943 until she retired in 1946

Miss M C CLARKE R R C died on 18th July 1962 at the age of 82 She trained at St. Thomas's Hospital and joined the Q.A.R.N.N.S on 27th November 1908 She became Matron in 1920 and served at the naval hospitals Haslar Malta and Plymouth

Miss Clarke retired in 1935 and rejoined in September 1939 She then served as Matron at Kingsea until she retired on 9th September 1942.

HONOURS

Companion of the Most Honourable Order of the Bath

Surgeon Rear Admiral Derek D Steele Perkins C V O Q H S F R C S F R A C S D L O

Order of the British Empire

Surgeon Commander Wm Andrew Bernett M R C S L R C P

HIGHER QUALIFICATIONS

F R C P (Edin)	Surgeon Captain E D Caldwell (by election)
F R C S I (Eng)	Surgeon Lieutenant-Commander P C Fulford
F R C S (Eng)	Surgeon Lieutenant Commander J Bertram
F F A R C S	Surgeon Lieutenant-Commander N G H Hersey
Primary F R C S	Surgeon Lieutenant F R Wilkes
M Sc (Radiobiology)	Surgeon Lieutenant Commander D M Ackery
D A	Surgeon Lieutenant R H W Peck
D A	Surgeon Lieutenant D A Lammiman.

NEW ENTRIES

Surgeon Lieutenant-Commander P D Jackson B A M B B Ch F R C S (Edin) Surgeon Lieutenants A Dumbreck M B Ch B J A M Wright M B, B Ch B A O and Surgeon Lieutenant (D) M D Hocking L D S Aetg Surgeon Lieutenants R P Genton Bunn M R C S

[illegible] R.C.P. P. L. Golding, M.B., B.S., M.R.C.S., L.R.C.P., Surgeon Sub-[illegible] (Medical Cadets) K. M. Heaton, P. K. D. Hush, L. G. Measey, D. G. MacDonald, C. A. Offord, C. M. Mackie, A. D. Oliver, I. R. Gibbs, W. R. Tindy, W. M. A. Nobbs, N. M. Hutchings, N. E. Hedley, P. M. Coats, P. Proudman, G. M. Welham, M. F. Ineledon, T. J. Herbert, W. A. K. Burke, W. D. C. Mallam, H. J. Venny, J. R. Robertson, J. F. A. Langley, A. J. R. Macdonnld, J. G. Munro, D. L. McCurdy, M. R. Mullin.

SHORT SERVICE COMMISSION CONVERTED TO FIVE YEARS

Surgeon Lieutenants F. R. Wilkes, R. R. Evans, I. P. Burgess-Watson, N. Carr. Surgeon Lieutenant (D) D. L. May.

PROMOTIONS

To Surgeon Vice Admiral: Medical Director General of the Navy, D. D. Steele-Perkins, C.B., C.V.O., Q.H.S. (30463).

To Acting Surgeon Commander: K. P. O'Byrne, L.R.C.P. & S., D.P.H.

To Surgeon Lieutenant-Commander: R. J. Carmichael, M.B., B.S., J. M. Young, M.R.C.S., L.R.C.P., A. J. Rintoul, M.B., Ch.B., D.D.E., P. Beck, M.B., Ch.B., K. P. S. Lumley, B.M., B.Ch.

To Acting Surgeon Lieutenant (ex pre-registration): N. E. Worrall, M.R.C.S., L.R.C.P.

TRANSFERS TO THE PERMANENT LIST

Surgeon Lieutenant-Commander: R. J. W. Adamson, M.B., B.S., M.R.C.S., L.R.C.P., D.Obst., R.C.O.G.

Surgeon Lieutenant: N. Lis, M.B., B.S., M.R.C.S., M.R.C.P.

Surgeon Lieutenant-Commander (D): J. M. Poppelwell, L.D.S. Surgeon Lieutenant (D): D. M. Lindsay, D.B.S.

RETIREMENTS

Surgeon Lieutenant-Commander: C. N. Barnes (medically unfit).

TERMINATION OF SHORT SERVICE COMMISSIONS

Surgeon Lieutenants: I. C. Sutherland, J. S. Posey, J. G. Miller, P. G. Gillam, P. S. H. Brown, R. S. Mackintosh, G. MacKay, I. W. M. Baxter, M. Andrews, G. F. Jones, D. H. Gudgeon and Surgeon Lieutenant (D): D. J. Malcolm.

WARDMASTERS

Promoted to Wardmaster: Lieutenants, J. T. M. Dineen, D. E. Milligan and O. A. Saunders. Confirmed in rank of Wardmaster: Sub-Lieutenant, J. F. Hammond.

QUEEN ALEXANDRA'S ROYAL NAVAL NURSING SERVICE

Promoted to Superintending Sisters: Misses A. M. Tynan, S. M. Hayes, S. R. P. Burton and V. Davison.

Member of the Royal Red Cross, First Class

Miss Nancy H. Glew, A.R.R.C., Principal Matron.

Associate of the Royal Red Cross, Second Class

Miss A. E. Ethendge, Head, Naval Nursing Ancillary.

ROYAL NAVAL RESERVE
HONOURS AND AWARDS
Queen's Honorary Dental Surgeon

Surgeon Captain (D) J. Symmons, V.R.D.

NEW ENTRIES

Surgeon Lieutenants: I. A. Hunter, M.B., B.S., D.Obst., R.C.O.G., M. W. G. Wren, M.B., Ch.B., M.R.C.S., L.R.C.P.

Ty. Surgeon Lieutenants (D): I. R. Southwick, B.D.S., J. T. McIlrath, L.D.S., R.F.P.S.G.

PROMOTIONS

To Surgeon Lieutenant-Commander: H. H. Ross, M.B., B.S., M.R.C.P., D.P.W. Robinson, M.B., B.S., D.S. Munro, M.B., Ch.B., D.Ch., D.Obst., R.C.O.G., J. S. Young, M.B., Ch.B., G. L. Evans, M.B., B.S., M.R.C.S., L.R.C.P.

RETIREMENTS

Surgeon Captain: A. D. Pyne, V.R.D., M.R.C.S., L.R.C.P. (Placed on Retired List).

Surgeon Lieutenant-Commander: R. I. H. Barnard, M.B., B.S. (Resignation accepted).

Temporary Commissions Terminated: Ty. Surgeon Lieutenants: B. L. S. Slater, J. Sutherland, B. Tomlinson, J. D. K. Burton, G. G. Carmichael and J. E. Crockett.

CIVILIAN APPOINTMENT OF RETIRED ROYAL NAVAL MEDICAL OFFICER

Surgeon Captain J. L. S. Cullen, D.S.C., [illegible].R.C.S.(Eng.), L.R.C.P. (Barrister-at-Law), R.N. (Retired), Medical Director of the Ainsworth Pharmaceutical Company Limited, was appointed to the Board of Directors of the Company on 24th October 1962.

ADMIRALTY FLEET ORDERS

(This page is perforated for filing purposes)

1320 —Medical Stores—Cotton Lint—Use for Cleaning Radar Display Masks.

1352 —Food Poisoning—Reports

1390 —Invalliding

1408 —Civilian Non-Industrial Staff—Pay—Medical Grades

1429 —Medical—Eyesight—Spectacles—Supply, Repair and Replacements

1474 —Medical—Change of Medical Category—Reporting

1539 —National Insurance—Disposal of Medical Certificates

1600 —Medical—Airmen—Colour Perception Standards

1641 —Medical—The Hospital Service Plan

1674 —Form D189 (Hurt Note).

1683 —Workpeople—Cessation of visits to Home of Workpeople injured at work

1834 —Medical Officers—Diploma Pay

1931 —Advancement—Ratings—Medical Qualifications

1937 —Geneva Convention—Protection of Medical, etc , Personnel in War—Armlets and Certificates.

1941 —Travelling—Visits under the Dilfor Scheme.

1985 —Courses—R N Air Medical School—Courses of Instruction

1988 —Medical—Combined Services Psychiatric Treatment Centre

2078 —Pay and Allowances—Officers—Entry of Medical and Dental Students and Pre-Registration Year Doctors into the R N R —Rates of Pay

No. 2 Spring 1963 Vol XLIX

Journal

of the

Royal Naval Medical Service

PUBLISHED QUARTERLY

(The Admiralty does not accept responsibility for the opinions expressed in this Journal)

PAGE

EDITORIAL 65

PAPERS read at the Joint Symposium by R.N. Medical School and R.N. Air Medical School on Wednesday, 28th and Thursday, 29th November 1962

The Environment of a Space Capsule By COMMANDER KENNETH R. COBURN, M.S.C., U.S.N. 67

Naval Aircraft Underwater Sink Rate Trials 1962 By SURGEON COMMANDER J. S. P. RAWLINS, *O.B.E.*, M.A., F.M., B.Ch., R.N. 74

Heat in Engine Rooms By SURGEON COMMANDER P. E. NICOL, M.B., Ch.B., D.P.H., D.I.H., R.N. 83

A Case of Low Blood Pressure By SURGEON LIEUTENANT-COMMANDER D. C. McNUTT, *M.B.E.*, M.B., Ch.B., R.N. 86

Cold Immersion By SURGEON LIEUTENANT P. CANNON, M.B., B.Ch., M.R.C.S., L.R.C.P., R.N. 88

A Review of the High Altitude Selection Test 1961/1962 By SURGEON LIEUTENANT T. R. GROVE, M.B., B.S., M.R.C.S., L.R.C.P., D.Obst.R.C.O.G., R.N. 93

Underwater Ejection By SURGEON LIEUTENANT-COMMANDER A. F. DAVIDSON, M.B., Ch.B., R.N. 97

NAVAL MEDICAL COMPASSIONATE FUND 100

ARTICLES—

Agemgin the Royal Navy—Part III By SURGEON LIEUTENANT-COMMANDER W. D. WRIGHT, M.B., Ch.B., M.R.C.P.(Edin.), R.N. (Retired) 102

The Medical Library, Royal Naval Hospital, Plymouth By SURGEON CAPTAIN B. S. LEWIS, *D.S.C.*, M.R.C.S., L.R.C.P., R.N. 115

A Bath in a Daring Class Destroyer By SURGEON LIEUTENANT-COMMANDER J. A. CAMERON, M.B., Ch.B., R.N. 119

Efficiency and Freedom from Side Effects of Slow Release Ferrous Sulphate (Fesspan Spansules) By DOCTORS M. L. J. SEGALL, M.B., B.S., formerly Captain R.A.M.C., L. P. SAYERS, M.B., B.Ch., B.A.O., formerly Surgeon Commander R.N.V.R., L. R. SWEETMAN, M.B., B.Ch., and R. C. TYNER, M.B., B.Ch., B.A.O., formerly Surgeon Lieutenant R.N.V.R. 171

The Use of Eskonarkon for Royal Naval Aircrew undergoing High Altitude Training By SURGEON LIEUTENANT-COMMANDER J. MURRAY YOUNG, M.R.C.S., L.R.C.P., R.N. 124

CLINICAL NOTES AND CASES—

The Use of the Operation of Medical Rectus Recession in a Series of Fifty Children with Convergent Strabismus requiring Surgical Correction By SURGEON COMMANDER P. D. A. DURHAM, M.B., B.S., M.R.C.S., L.R.C.P., D.C.H., D.D., R.N. 177

Two Hundred Cases of Venereal Disease By SURGEON LIEUTENANT D. S. WRIGHT, M.B., B.S., R.N. 133

REVIEWS 141

NEWS OF THE SERVICE—

Obituaries, New Entries, Pre-Registration Entries, Entered as Medical Cadets, Re-Entries, Transfers to the Permanent List, Short Service Commission converted to five years, Short Service Commission converted to six years, Promotions, Retirements, Completion of Short Service Commission, Wardmasters, Queen Alexandra's Royal Naval Nursing Service, Royal Naval Reserve 146

ADMIRALTY FLEET ORDERS 149

NOTICE Inside Back Cover

EDITED BY

THE STAFF OF THE ROYAL NAVAL MEDICAL SCHOOL

ALVERSTOKE, HAMPSHIRE

Editorial

A SELECTION of papers from the Symposium on Current Naval Medical Problems, which was held by the Royal Naval Medical School and Royal Naval Air Medical School in the latter establishment on Wednesday and Thursday 28th and 29th November 1962, forms the bulk of this issue. This meeting was the third of its kind and the enthusiasm with which it was received and the large attendance undoubtedly justifies its continuance. In order to ensure that these papers are produced in the same issue of the JOURNAL it has been necessary to postpone reproduction of other articles and the Editors hope that contributors will appreciate this reason for delay in publication. Only financial consideration prevents the issue of a fatter JOURNAL. One article which has been delayed with great regret is a welcome contribution by Surgeon Lieutenant D. A. Noble of the Royal Australian Navy on 'Thermal Comfort in a Small Warship'. This will now appear in the next number.

Surgeon Sub Lieutenants are now accepted in the Service and occasionally visit Naval establishments. They have shown interest in the JOURNAL and it has been agreed that until they are fully qualified they may obtain the JOURNAL at half price.

The refreshing article by Surgeon Lieutenant-Commander J. A. Cameron, R.N. on 'A Bath in a Daring Class Destroyer' revives many memories for those of riper years who look back on a sequence of bathing with difficulty. The harder it is to obtain a bath the more insistent people seem to be on achieving this daily ablution. One of the crudest bathing systems some will remember was in the China gunboats some of which had no officers' bathroom and the best that could be accomplished was a large copper dish which the Chinese stewards filled with water of dubious origin and placed in a narrow passage between the minute officers' cabins. It was often hotter outside the bath than in it. In later gunboats an officers' bathroom was constructed which opened on to the quarter deck immediately alongside the gangway. Frequently the Medical Officer whose job it was to supervise the drinks for cocktail parties found that his last-minute bath and change coincided with the arrival of the guests. He was thus imprisoned until their departure unless with characteristic aplomb he was prepared to walk through the guests with a towel round his tummy (nonchalantly picking up a drink as he passed). In many larger ships bathing facilities for officers were excellent though the means of heating the water was to say the least frightening. One tap supplied cold water and just above the plug was a vent from which super heated steam could be roared in. Having introduced six inches of cold water into the bath the steam valve was opened and a jet shot into the water causing great noise and turbulence and when the required heat was reached the valve was closed. Like most Naval plumbing, satisfactory closure of the valve was never fully achieved and frequently during a minute of relaxation a jet of scalding steam would impinge on the sole of the foot or the toes would come into contact with the metal mouth of the inlet which always remained scorching hot. In some parts of the world par-

[illegible] shore-based personnel were often very much worse off because of the [illegible] lack of fresh water. During the war stations in West Africa frequently had to [illegible] for months on end with a ration of two petrol cans per man per day for all purposes. Undaunted the evening bath consisted of standing naked in a small enamel wash bowl with water just touching the ankles. Fortunately cigarettes on this station were sold in tins of 50 and these tins could be used to ladle meagre quantities of water over the body. Great skill was needed in the race against evaporation and spillage to ensure that all the lather was rinsed off. But what fun it all was and how Cameron's paper stimulates so many nostalgic memories. Modern ships have many conveniences but somehow the replacement of the long lingering bath by the uninteresting short-time messy inadequate shower in its formica lined cabinet has little to commend it for sheer pleasure. In spite of the chromium fittings it is almost impossible to get an ideal mixture of hot and cold water.

read in the Joint Symposium by Royal Naval Medical Service and the Royal Air Force Medical School on Current Underwater and Aviation Medical Problems
Wednesday 28th and Thursday 29th November 1962

THE ENVIRONMENT OF A SPACE CAPSULE

By Commander KENNETH R COBURN, M.S.C., U.S.N

THE manned capsule of an orbiting vehicle must provide the occupant with an environment to sustain life under the hostile environment to which he will be subjected. The stresses which comprise the environment are of five types: (1) high G loading under launch re-entry and impact; (2) low atmospheric pressure at high altitude; (3) weightlessness while in orbit; (4) cosmic radiation at apogee and finally; (5) high temperatures produced by aerodynamic heating during the re-entry phase of the flight.

High G Loading. In order to place a vehicle into an orbit around the Earth it is necessary to impart to that vehicle sufficient energy to accelerate it to the required orbital velocity i.e. approximately 18 000 miles per hour or about 200 plus G seconds. If it was feasible from the engineering point of view it would be best for the astronaut to accelerate the vehicle at 1 G for the required length of time to achieve the desired velocity. However with the present fuels which burn very rapidly it is necessary to impart the energy necessary for orbital flight within a rather short period of time. This means that the astronaut must be prepared to accept G loadings considerably in excess of the 1 G Earth normal. The current rockets deliver a programmed maximum of about 8 G on launch and re-entry this G loading being applied in reference to time in the form of a sine wave peaking at 8 G. However if emergency measures should be necessary on launch the peak G loads may exceed 11 G. It is therefore necessary to ensure that the astronaut be adequately protected against these emergency peaks as well as being able to sustain the spike G loadings of 20 G and 40 G which must be borne in water and land landings respectively.

The primary protection against these high G loadings lies in the positioning of the astronaut with respect to the G vector. The optimum orientation has been found to be to place the astronaut in a sitting position on his back with a 12° head up inclination so that the forces of acceleration on launch and deceleration on re-entry are applied from back to front or as the astronauts jargon has it "eye-balls-in position". This orientation minimizes the heart-to-head distance and with the lower legs and thighs above the trunk prevents pooling of blood in the lower extremities thus implementing the venous return so that the cardiac output can be maintained. In addition a modified Valsalva manœuvre is employed to ensure that even at peak G loads, vision is clearly maintained.

In order to ensure maximum comfort a moulded couch is employed to support

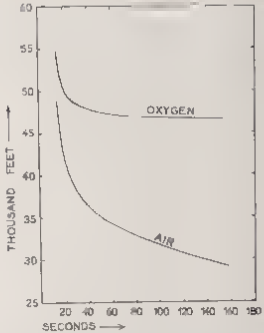


Fig. 1. Time of useful consciousness after rapid decompression to an altitude in 100 per cent oxygen
(From *Lufft J. Aviat. Med.* 22: 117, 1951.)

each astronaut. These couches are built of honeycombed aluminium from individual sand casts so that each astronaut obtains maximum comfort as well as the best possible support. This is a prime requirement for, under high G loads the human body tends to become a viscous fluid and therefore flows to the lowest point available.

The high-level, short duration G loads at capsule impact, whether on land or on water, are well within experimentally established limits and do not present any problems.

Reduced Atmospheric Pressure. The primary problem presented by reduced atmospheric pressure is that of hypoxia. This condition manifests itself at about 5,000 feet, where a definite diminution in night vision is noticeable. With increasing altitude the symptoms become more pronounced and the "time of useful consciousness" decreases exponentially (see Fig. 1) up to an altitude of 50,000 feet. At this altitude and above the "time of useful consciousness" reaches a minimum of 15 seconds. This is due to the fact that at this altitude, the lungs are filled with water vapour and carbon dioxide, the breakdown products of carbohydrate catabolism, and even though there is oxygen in the ambient air (pO_2 17.4 mm. Hg.) it cannot be utilized. At this altitude the hypoxic state becomes an anoxic state and no oxygen is available to the body.

A further problem presents itself at 63,000 feet, where the atmospheric pressure is 47 mm. Hg. This pressure is critical to the human body as it equals the vapour pressure of water at body temperature, 37° Centigrade. Boyle's law states:

$$P_1 V_1 = P_2 \times V_2 \qquad \text{Equation (1)}$$

where P_1 and P_2 represent initial and final pressures,
and V_1 and V_2 represent initial and final volumes.
In dealing with physiological gases it is necessary to modify the form of the equation to account for the fact that all gases within the body are saturated with water vapour which, at body temperature, exerts a pressure of 47 mm. of Hg. Thus we have:

$$(P_1 - 47)\ V_1 = (P_2 - 47)\ V_2 \qquad \text{Equation (2)}$$

Reworking, we have:

$$\frac{(P_1 - 47) \times V_1}{(P_2 - 47)} = V_2 \qquad \text{Equation (3)}$$

By assuming values of 760 mm. Hg. (atmospheric pressure at sea level) for P_1, 47 mm.



Fig 2 Merc[illegible]ric Hill

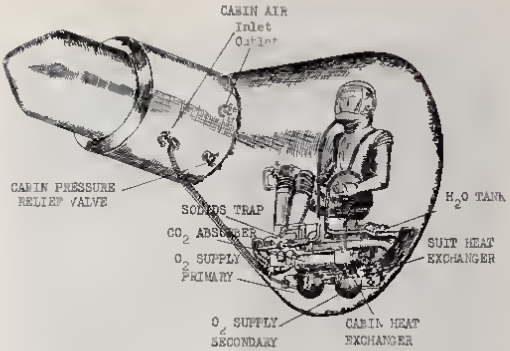


Fig. 3 Approximate physical arrangement of spacecraft environmental control system

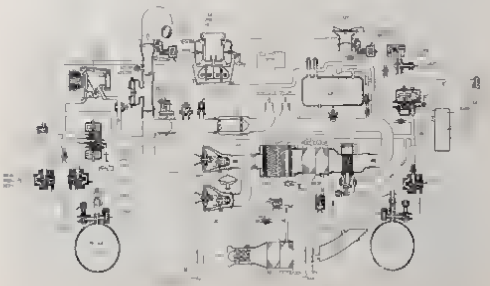


Fig. 4 Schematic diagram of environmental control system

Hg (atmospheric pressure at 63 000 feet) for P_1 and unity for V_1 then solving Equation (3) for the value of V_2 we obtain

$$\frac{(760-47)}{(47-47)} \quad V_2 \qquad \text{Equation (4)}$$

therefore $\frac{713}{0} \quad V_2 = \text{infinity}$ Equation (5)

In these circumstances all water in the body eventually vaporizes (97 per cent of total body weight) Evaporative boiling occurs in the tear ducts blood plasma tissue fluids urine in bladder ureters etc

At all pressure altitudes above 22,000 feet the possibility of decompression sickness exists unless complete denitrogenation is carried out prior to exposure to reduced pressures

As a consequence of these hazards it is necessary to provide a pressurization system in which an artificial environment as near to sea level values as practicable is maintained In the Mercury spacecraft a closed system is employed using 100 per cent oxygen both for breathing and for suit pressurization The capsule altitude is kept at about 35,000 feet pressure altitude therefore breathing 100 per cent oxygen maintains the tracheal pO_2 at sea level value As a back up measure the astronaut wears a full pressure suit designed to protect him in the event of failure of the capsule pressurization system (see Fig 2)

Details of the environmental system are shown in Figs 3 and 4

During the orbital portion of the flight the capsule and its contents become weightless as the effective gravitational attraction of the Earth falls to zero This does not mean that the capsule has escaped the Earth s gravitational field but only that sufficient velocity has been attained to maintain an orbital course

It is impossible to produce a weightless state of any significant duration within the Earth s atmosphere although "sub-gravity" and hypodynamic states can be produced by various techniques Immersion studies 2 3 4 and 5 have shown that certain physiologic changes might be expected to occur after prolonged periods of weightlessness Muscular atrophy can be expected unless a rigorous exercise schedule is maintained However, of more serious concern is the ability to sustain the re entry G load which could conceivably impose severe stress to the cardiovascular system after prolonged weightlessness This strain is more likely to affect the right side of the heart than the left for the following reasons The work done by the heart can be determined from the equation

$$W = QP = \tfrac{1}{2}mv^2 \qquad \text{Equation (6)}$$

where W represents work in ergs (dyne centimetres) per second Q represents the quantity of blood in c c per second P the pressure in dynes per centimetre m the mass in grams and v the velocity in centimetres per second Further the QP portion of the equation denotes the potential work while the $\frac{1}{2}mv^2$ portion denotes the kinetic

work. Thus if 100 c c of blood is raised to a pressure of 100 mm Hg the potential work performed equals

$$W = 100 \quad 100 \quad 1\,332 \qquad \text{Equation (7)}$$

(1 332 represents the conversion factor from mm Hg to dynes per cm²)

or

$$W = 1.332 \quad 10^7 \text{ ergs for the left heart} \qquad \text{Equation (8)}$$

and for the right heart

$$W \quad 1\,332 \quad 100 \quad 20 \qquad \text{Equation (9)}$$

or

$$W \quad 2\,664 \quad 10^5 \text{ ergs} \qquad \text{Equation (10)}$$

The kinetic work for the left heart may be calculated from Equation (6)

$$W = 1\,056 \text{ (specific gravity of blood)} \quad 10^2 \quad 10^2 \qquad \text{Equation (11)}$$

Solving

$$W = 5\,28 \quad 10^5 \text{ ergs} \qquad \text{Equation (12)}$$

to handle 100 c c of blood or more specifically 105 6 grams of blood imparting to his mass a velocity of 10 cm per second

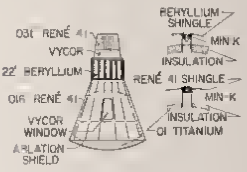


Fig 5 Arrangement of heat protection elements

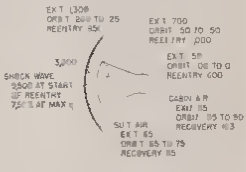


Fig 6 Representative temperatures in degrees Fahrenheit

The kinetic work factor for the right heart is the same as that for the left one

$$W = \tfrac{1}{2}mv^2 = 5\,28 \quad 10^5 \text{ ergs}$$

The difference in the work load of the heart therefore lies with the potential work factor However the variation of one factor or the other can throw unequal burdens upon one side or the other If, for example the cardiac output were to be increased by a factor of 10 (this figure is for ease of computation only as in reality only about a fivefold increase can be accomplished) the potential work would increase by a factor of 10 However, to increase the output 10 times the velocity must also increase 10 times, as the size of the arterial openings remains essentially unchanged This increases the kinetic work factor by 1,000 times as it is proportional to mass and the *square* of the velocity Now the distribution of the work of the heart is reversed with the kinetic factor accounting for 80 per cent of the left heart's work and 98 per cent of the right heart's work

Under conditions of zero G for prolonged periods of time, it is conceivable that in addition to loss of myocardial and vascular tone, the heart the right side

particularly would [illegible] to handling the weightless mass of blood and thus be overwhelmed by the strain during re-entry of the increased weight of the blood.

The problem of shielding the astronaut against cosmic and Van Allen radiations has yet to be dealt with. Past and planned orbital flights will take place beneath the Van Allen belts and the increase in the absorption of radiation due to cosmic particles has merely been accepted as the dosages are well below the LD_{50} level. Entire flights to the moon or nearby planets will have to take these factors into consideration. The Van Allen belts can be avoided by polar launches but long duration exposure to cosmic sources particularly during periods of intense solar activity are extremely dangerous—lethal in many cases.

The hazards from increased temperature as a result of aerodynamic heating during re-entry are great. However they have been satisfactorily dealt with. Fig. 5 shows details of the ablation shield and insulation required to deal with the magnitude of temperatures shown in Fig. 6.

While the environment of present space capsules cannot be described as either luxurious or commodious it nevertheless is comfortable and life sustaining for the present periods of use. Planned interplanetary flights of long duration must necessarily look to the possibilities of closed environmental systems utilizing micro organisms and green plants as sources of food, oxygen, carbon dioxide removal and waste disposal. These systems impose a severe weight penalty at lift-off but recent rocket engineering developments have shown that this will not be a limiting factor.

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NAVAL AIRCRAFT UNDERWATER SINK RATE TRIALS, 1962

By Surgeon Commander J S P RAWLINS, R N

Introduction

Since 1956 the R A F Institute of Aviation Medicine has been conducting a series of investigations into the problems of escape from submerged aircraft That this is a serious problem is indicated by a recent survey[1] of ditching accidents in the Fleet Air Arm covering the period 1st January 1955 to 31st December 1961 This showed that although only 12 per cent of major accidents were ditchings 52 per cent of these were fatal which represents one-third of the total fatalities from all causes for the period For comparison in the United States Navy 49 per cent of ditchings are fatal, representing 4t per cent of the total accident mortality "

The Institute of Aviation Medicine has approached the problem from various angles and the sequence of investigations has often been dictated not by logic but by the availability of research facilities or as a result of the conditions imposed by some change in aircraft, routine or equipment

After defining the various problems imposed by underwater escape, a series of possible solutions has been explored some of which have had to be abandoned subsequently owing to a change in equipment or conditions The investigation into the effects of blast from the latest type of ejection seat cartridge reported in the Spring issue of the JOURNAL for 1962 showed that it was no longer feasible to use the standard ejection seat as a means of underwater escape and, accordingly efforts had been concentrated on developing automatic escape systems based on ejection of the seat by compressed air[2]

One of the fundamental requirements for development of an underwater escape system is a knowledge of the behaviour of an aircraft after it has entered the water This has been recognized for a long time but although the need for a study has been repeatedly urged, it was not until 1962 that an opportunity arose of carrying it out It arose from an investigation into the underwater escape potential of a French Naval strike aircraft the Etendard IV at the Admiralty Hydro Ballistics Research Establishment in October 1960[3] The effectiveness of the canopy jettison system in this aircraft is marginal depending on the underwater rate of sink which determines the rate at which pressure builds up across the canopy If the rate of sink is slow leakage of water into the cockpit through various orifices will raise the pressure of the air trapped in the sealed cockpit and oppose the water pressure acting on the canopy Provided that the differential pressure across the canopy does not exceed 2½ p s i the canopy can be jettisoned At greater differential pressures the jettison system will be unable to cope and as the aircraft sinks the pressure will build up until the canopy implodes with destructive violence The moment of implosion absolutely limits the time available for escape

Obviously a knowledge of the sink rate is required in order to be able to define the limiting time and depth for successful canopy jettison and the limiting time and depth for escape (e.g. by ejection through the canopy). The French were quick to appreciate the importance of sink rate and promptly set about arranging to carry out trials with an Etendard off Toulon. They courteously invited the British to participate.

By good fortune it happened that a Seimitar, the property of the Ministry of Aviation, was approaching the end of its useful life. This was allotted to the trials project and its last flight was from Wisley to the French Naval Air Base at Hyeres.

Programme Planning

The object of the trial was to investigate the behaviour of an aircraft after being dropped into the water in various attitudes and in various configurations as regards weight and distribution of buoyancy. The obvious major variations in weight are the take off condition in which all fuel tanks are full and the landing condition when nearly all the fuel has been used.

All air spaces in the engines, wings and fuselage of an aircraft are sources of buoyancy when it first enters the water but most of these are not sealed and water soon displaces the air. However certain areas are sealed to permit pressurization at altitude and although these have inward relief valves to permit the ingress of air on return from high altitude flight (during which they are pressurized at some intermediate equivalent altitude) water enters through these valves relatively slowly and air is trapped in the compartments.

The main source of trapped buoyancy is the cockpit but in the Seimitar there is also a sealed radio bay near the tail, which contributes a further 2,000 lb of buoyancy. An American programme on underwater sink rates had indicated that the rate was a function of the underwater density of the aircraft: the first requirement of the current programme was to check this theory.

Recording the behaviour of the aircraft after it had sunk beneath the surface was a major problem. Instrumentation could provide a record of pressure (and hence depth) against time for the fuselage and for the interior of the cockpit and hence differential pressure across the cockpit wall. Thermistances arranged mutually at right angles could provide information regarding the water level in the cockpit from which could be derived the rate of water entry and also some information regarding the attitude of the aircraft. Rate of change of attitude in pitch, roll and yaw could be obtained from gyros rotating about three axes and accelerometers in the same three axes could provide some information regarding accelerations. However with all these records against a common time base it would still be a tremendous task of analysis to plot the underwater path of the sinking aircraft, for there was no means of recording displacement from the dropping point against time except when the aircraft was resting on the sea bottom.

It was therefore very desirable to provide some continuous record of the geographical position of the aircraft which could be compared time-wise against the records of change of attitude and depth. Many methods of doing this were discussed but they all amounted to the same principle—triangulation from two or more known

points—and as the depth of water was to be 100 feet and according to the French up to 120 feet of visibility could be expected it seemed feasible to do this with cameras mounted on the sea bed

Responsibilities

It was agreed that the trial would be under the technical direction of the Chef du Service Mesures of the Commission d Etudes Pratiques d Aviation at St Raphael Scientific direction of the trial was shared between the Institute of Aviation Medicine and the Laboratoire Medico—Physiologique of the Centre d Essais-en Vol (CEV) Preparation and maintenance of the two aircraft would be carried out by representatives of the two aircraft firms Dassault and Vickers, under the direction of British and French Naval Air Engineers All diving would be under the control of the Groupe des Etudes et Reserches Sous Marine (GERS) from the diving ship *L Ingénieur Elie Monnier* and the trial would be conducted from the French Naval Helicopter Base at St Mandrier on the seaward arm of Toulon Harbour The aircraft would be dropped from a 100 ton floating crane hired for the day from a salvage company which would be towed to the dropping area by tugs and moored to prepositioned buoys with an accuracy of plus or minus one metre

The French would be responsible for the design and construction of the instrumentation the British would be responsible for the photographic commitment including design and construction of the sea bed cameras design construction and operation of hand-held underwater cameras high-speed underwater photography as necessary and the making of a documentary film covering the whole trial

Instrumentation

This was to be self-contained and comprised one watertight case about the size of a dustbin containing the gyros accelerometers and the galvo recorders, two smaller cases containing the supply batteries and the relays and connected to these by water proof plugs and cables the pressure and water level transducers Apart from the latter the entire system transducers connections and recording gear was duplicated to guard against failure of any one component

Photography

This was the responsibility of Instrument and Ranges Division of the Royal Aircraft Establishment For position plotting from the sea bed Eclair Cameflex cameras with wide angle lenses running at eight pictures per second were chosen Each camera together with its motor and power supply was housed in a specially designed alloy watertight case fitted with a three-and a half inch Ivanoff pre objective to permit use of the full field of view of the camera lens without lateral chromatic aberration The cases were mounted on trunnions from a heavy circular base so that they could be placed on the sea-bed and aligned accurately with an inclinometer

The three cameras were interconnected by a sheaf of waterproof cables which also connected them to the control boat at the surface from which a common time base was supplied to each camera Magnesium flares were mounted on the tail and



Fig. 1. Ejection [illegible] through the [illegible] broke [illegible]



[illegible] ekpit

[illegible]g tips of the aircraft and for accurate position plotting an image of a flare was required on any two cameras.

The hand-held cameras were 16 mm Telfords with 200 foot magazines and self-contained rechargeable power supply. These were mounted in watertight perspex [illegible]s and a flashing light on the back of each camera indicated when film was actually passing through the gate. An identical case was also used to mount a high speed 16 mm Photosonics camera operating at 600 pictures per second on the port wing, covering the cockpit canopy and a low speed camera was mounted on the starboard wing. The object of these was to record implosion of the cockpit canopy and for this purpose provision was made for starting the high speed camera by a "make" from the





differential pressure unit in the main instrument container shortly before implosion was anticipated. For illumination two 350-watt lamps in watertight housings were mounted in the cockpit and a 50 c.p.s. time-base generator switched on before the drop. placed a common timing mark on the instrumentation records and operated a neon lamp in the high-speed camera.

The hand-held cameras were operated by R.N. officers from the Institute of Aviation Medicine and Human Engineering Division of the R.A.E. with the expert advice and assistance of M. Fréderic Dumas of the GERS.

Aircraft Preparation

Another major task was the preparation of the aircraft. The instrument containers were very heavy and their contents were vitally important. Originally it was intended to eject the main container automatically at a depth of 60 feet to prevent damage when the aircraft struck the sea bed. However this plan was abandoned as being too complicated and mounting sites were chosen which were thought to give the greatest protection. In the Etendard the main containers were mounted in the fuselage aft of the cockpit and the relay container was mounted in the cockpit. In the Scimitar the relay container was also in the cockpit, the supply and main containers being fitted into the jet pipe shrouds. In addition an inflatable lifting bag was fitted beneath the skin of the upper part of the fuselage of the Etendard, the skin covering it being secured by rubber bungees, the idea being to inflate the bag automatically at 60 feet and thereby to slow down the descent of the aircraft to the bottom. In fact this system did not work and was abandoned after the first drop.

The only major modification to the Scimitar was the cutting of a circular hole in the cockpit wall and the fitting of a 10 inch bursting disc in order to prevent the differential pressure becoming high enough to cause the canopy to implode.

Programme

The Etendard used for the trial was the sixth prototype and not representative of a production aircraft. The French therefore regarded the trial as a pilot experiment in preparation for a more sophisticated trial in 1963. For this reason their programme was mainly designed to provide information about trial techniques. For this purpose they proposed five test drops, all with the canopy in place and all at the landing (empty) weight: in the normal, nose up, nose-down, one wing low and inverted attitudes. For the Scimitar the British proposed drops in the normal nose up and nose-down attitudes at take off weight with the canopy on, one nose-down test at take off weight with the canopy off and one test in the normal attitude at landing weight with the canopy on. One test was to be made with the bursting disc blanked off in order to record the depth and manner of canopy implosion and two tests were reserved for trials of the Martin Baker Automatic Underwater Escape System. An inverted drop would be carried out if time allowed.

Progress of the Trial

The site for the trial was chosen and the mooring buoys laid out before the British team arrived. The first task was to lay out accurately the positions for the sea bed

carrier. This was done by the CERS and the first drop of the Etendard was made on 6th July.

The test was not an unqualified success from the point of view of establishing the behaviour of the aircraft, but that was not the main object. Much valuable information in techniques of handling and recovery was gained. The aircraft floated for two and a half minutes. It then sank tail first, flattened out and alighted on its wheels at the bottom. The flares failed to ignite and the canopy, which had been heavily reinforced with fibreglass, imploded. The lifting bag in the fuselage only half inflated. The aircraft was filmed all the way to the bottom, where an inspection was carried out by the photographers and further film taken to show the extent of the damage. Slings were then placed around the aircraft by two of the CERS divers using French oxy-nitrogen mixture equipment, and the floating crane was moved into position for the recovery.

During the tests which followed, techniques steadily improved, but it soon became apparent that the test site had been badly selected. Visibility never once reached 100 feet, so that, despite all the efforts of I and R Division, the sea bed cameras were unable to record the flares and hence to plot the sink path. The mistral blew at over 30 knots for periods of a week at a time, making it impossible to move the crane and although it was sometimes possible to beat the mistral by running the tests at 4 a.m., another unexpected problem arose in the form of ground-swell. This caused a tremendous movement of the crane jib, and handling of the Scimitar under these conditions was extremely hazardous and test after test had to be abandoned.

The first Scimitar test was accomplished successfully on 25th July, but during recovery the lifting gear parted just as the aircraft was breaking surface and it plunged to the bottom. Fortunately no damage was caused by this unscheduled drop.

On the third Scimitar test on 1st August, 45° nose down with the canopy off, the nose submerged and the aircraft then reappeared on the surface in the level position and floated for 40 seconds. It then sank rapidly in a nose-down attitude, striking the bottom at an angle of about 50°. It was quite impossible for the photographers to follow the aircraft down at this rate, which was subsequently shown to be 15 feet per second. Damage was considerable; the nose section being completely crumpled and the windscreen shattered. Further Etendard tests were now carried out while the three-man team from Vickers reconstructed the Scimitar's nose.

On 8th August the Scimitar was dropped again, but with a dummy pilot and with the Martin Baker Automatic Underwater Escape System. Complete success was achieved, the seat ejecting through the canopy at a depth of about 12 feet and the dummy separating from the seat and coming to the surface. Good films were obtained.

On 10th August the implosion test was carried out in conditions of very good visibility. The technique for starting the high speed camera proved highly successful and remarkable pictures of the implosion were obtained.

Finally, on 26th August, the Scimitar fitted once again with the Martin Baker Automatic Underwater Escape System and dummy pilot, was catapulted into the sea from the flight deck of H.M.S. *Centaur*. It struck the sea 200 yards ahead of the carrier with a huge splash, floated for some 20 seconds and sank. Examination of the remains on the bottom showed that the cockpit and air intake had broken off forward.

of the engines and were lying jammed under the starboard wing. Despite this damage the seat had ejected and all the separation equipment had functioned satisfactorily with the exception of the guillotine which cuts the line attaching the parachute to the seat-stabilizing drogues. The parachute had therefore deployed. There was no damage to the dummy suggestive of lethal injury, but the immersion suit was torn and in this condition the dummy was heavily negatively buoyant. The Mae West was inflated and it is probable that on actual pilot would have come to the surface.

Thus concluded the sink rate trials.

Results

Analysis of the instrumentation is still not complete, but certain observations on the tests can be made.

(a) The theory that sink rate is a function of density is incorrect. Sink rate is much more closely related to the mode of sinking, so that nose- or tail down sink rates are much more rapid than sink rates when the aircraft 'flies' underwater irrespective of density.

(b) In all conditions of the tests the aircraft floated much longer than had been expected.

(c) With the canopy off and the cockpit flooded very high sink rates may be experienced particularly in the Scimitar in which the buoyancy of the radio bay causes the aircraft to sink in the vertically nose down attitude.

Although detailed recommendations for escape procedure cannot be made until the analysis of the test has been completed, there are already strong indications that the present practice of jettisoning the canopy before hitting the water is liable to result in such a rapid rate of sink that the chances of successful escape are small.

On the other hand, the relatively long floating time which was a feature of all the tests makes it clear that absolute dependence on the automatic escape system as originally proposed by the Martin-Baker Aircraft Company (which required that the aircrew remain in their aircraft until it had sunk to a depth of some 12 feet) is unlikely to be acceptable to aircrew, and some form of manual override is required to enable aircrew to escape while the aircraft is still floating on the surface. From a functional point of view the first test of the Martin Baker automatic system was entirely satisfactory, and its performance in the second test was remarkably good considering the amount of damage to the aircraft.

In general the trial can be regarded as very satisfactory and the results are already being applied to the design of future aircraft underwater escape systems.

ACKNOWLEDGMENTS

This work was a joint Anglo French effort and the British team are indebted to their French colleagues both for their co operation and for their hospitality. The writer is personally indebted to his colleagues in the British team who worked indefatigably on this novel and difficult project and particularly to the Instrument and Ranges Division of the Royal Aircraft Establishment who bore the brunt of the responsibility for the British scientific contribution to the trial. They also made the

[illegible] was shown at the Symposium and supported the [illegible] the Officer Commanding Royal Air Force Institute of Aviation Medicine for permission to publish this report.

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HEAT IN ENGINE ROOMS

By Surgeon Commander P. B. NICOL, R.N.

HEAT in engine rooms has been a problem since the earliest days of steam. Only relatively recently, however, has this been a problem less for the ventilation engineer than the medical officer.

With the advent of nuclear warfare, should the necessity arise for forced ventilation to be closed off during any fall-out period, this will naturally result in rapidly increasing dry bulb and wet bulb temperatures in spaces such as engine rooms and boiler rooms. There are parallel problems in industry, for instance, the question of replacement of firebrick linings of furnaces in minimum time in order to maintain production quotas, a question it is understood, which is being investigated by the appropriate civilian authorities.

The tragic accident occurring in H.M.S. *Centaur* reminds us of the potential heat sources in an engine room or boiler room. In this case it is understood that the victims were subjected to steam at a temperature of 750°F. at something between 400 and 500 lb. pressure. This, of course, bears no true relation to the experiments about to be described.

Measures available to deal with the problem of rising temperatures are firstly, remote control of machinery and boiler room spaces. This tendency is increasing in all modern warships, but nevertheless routine maintenance and damage control must be maintained. Secondly, the ventilated suit has been developed and has been shown to allow an artificer to work in an engine room at an effective temperature of 30° C. for a period up to two hours. The ventilated suit, however, has its disadvantages in that it requires a large and disproportional quantity of air at a pressure of 80 lb. per square inch. It is to some extent cumbersome and necessarily requires air sources in the engine room resulting in an inevitable tangle of air supply hoses.

It is understood that it is not proposed to supply ventilated suits to all H.M. ships. Therefore it became necessary to investigate the problem of how long engine room or boiler room personnel were able, dressed in normal engine room clothing, to withstand these rapidly rising temperatures and perform maintenance and repair work and at the same time to find in what period of time they had recovered sufficiently to be able to repeat their previous task in similar temperature exposure.

This investigation was undertaken by the R.N.P.R.C. and M.R.C. and briefly consisted of exposure of volunteers to six different degrees of climate, first sitting, then standing, and finally standing and working. The object of the investigation was to estimate the tolerance times which could be expected of the average engine-room rating at such climates and to estimate his recovery time. Subjects were also given vigilance tests in an effort to assess at what point in rise of body temperature due to these conditions vigilance becomes affected.

Volunteers were supplied by H M S *Sultan* and consisted of P O mechanicians and leading mechanicians Tribute must be paid to these volunteers for undertaking a task which at times proved most trying and most uncomfortable All had passed a stringent medical examination Their ages varied from 19 to 31 They had not been subjected to tropical conditions for at least one year before volunteering

The sitting experiment was conducted in the climatic chamber at the Department of Human Anatomy Oxford University and the standing and working experiments in the climatic chamber at the Institute of Aviation Medicine Farnborough by kind permission of the Director Air Commodore W K Stewart

The vigilance tests at Oxford were visual and all volunteers for this part were shown by ophthalmic examination to have a normal degree of sight before the experiment At Farnborough the vigilance tests were auditory and in this case all volunteers were shown by audiometry to have an entirely normal range of hearing Engine room conditions were simulated as far as possible by a continuous tape recording taken in the gear room of H M S *Illustrious* steaming at approximately 18 knots and reproduced in the climatic chambers at a level of approximately 85 95 db

The climates chosen for the experiment were after much discussion based on the W B G T and weighted according to the formula used by Lind Weiner, Hellon and Jones in previous similar experiments This weighting was taken as 0 15 dry bulb—0 85 wet bulb to give a single figure in order to be able to plot temperature against time

Climates	*Dry Bulb*	*Wet Bulb*	*Weighted Temperature*
1	29 5 C (85°F)	24 5 C (76 F)	—
2	43 C (110 F)	35 C (95 F)	36 2
3	47 C (117 F)	36 C (97 F)	37 6
4	51°C (124 F)	37°C (98 5 F)	39 1
5	51°C (124 F)	43°C (110 F)	44 2
6	63 C (145 F)	47°C (117 F)	49 4

In addition to these climates one of 82 5°C (180 F) dry bulb and 60 C (140 F) wet bulb having a weighted temperature of 63 4°C was tested by research personnel It was found however that the maximum exposure to this temperature uncovered was in the nature of three minutes and with exposed parts covered to avoid direct effects to the skin at the maximum five minutes It was therefore considered unwise to expose volunteers to this climate

Results

Throughout the experiments the volunteers were taken deliberately to the point of collapse A medical observer wearing a ventilated suit was invariably in the chamber with the volunteers Oral temperature was continuously recorded outside the chamber by thermocouple Pulse estimations at increasingly short intervals with the rising climates were recorded by the observer in the chamber

It is not proposed here to go into a detailed statistical review of the experimental results which are contained in W V P and the R N P R C Report No 83 1962

Suffice it to say that in the lowest climate which was [illegible] control it was found that a four hour watch could be [illegible] the highest climate to which these volunteers were subjected [illegible] tion of tolerance to the conditions imposed was approximately 12 minutes working and up to 15 minutes standing at which point collapse was imminent It was found that vigilance tended to become impaired when the body temperature rose to 38 C (104 F) As regards recovery a period of 45 to 50 minutes was required before it was possible to return the volunteers to similar conditions of work and similar climate but after this period the duration of their tolerance was unchanged

It would naturally be unsafe to base positive recommendations on experiments taking volunteers to the point of collapse A curve was therefore constructed on the basis of allowing safe limits of 75 per cent of the times experienced in the actual experiment

Further investigations would seem to demand that these figures should be tested in actual conditions in a boiler room or engine room There are difficulties here for instance the fact that whereas these experiments were conducted in six definite known climates in a closed down engine room rises of dry bulb and wet bulb temperature would be graduated and possibly unpredictable In addition it would be necessary to ensure rapid evacuation of any volunteers showing signs of collapse a condition not always easily satisfied in the modern engine room There would also be the necessity for a considerable supply of air for observers with ventilation suits and it would seem desirable to produce an instrument to measure dry bulb wet bulb and possibly radiation temperatures and produce a single figure which would give an index to the officer in charge of safe tolerance limits at any fixed time during the close-down period

Motivation is also a problem which it is difficult to assess experimentally No doubt in circumstances of maintenance or repair during a wartime situation where the true urgency of the situation would be apparent tolerance times might be increased It is however extremely difficult to simulate such motivation in experimental conditions

A CASE OF LOW BLOOD PRESSURE

By Surgeon Lieutenant-Commander D C McNUTT, R.N

During a recent tour with the United States Navy I found that clinical medicine [illegible] is much discussion among the medical officers as in the United Kingdom A 19 year old farm boy from the mid west who had persuaded the recruiting [illegible] and presumably his examining physician that he was just the man to fly in the U S N was consequently given a rail ticket for the 1 500 mile journey to Pensacola where he saw the sea in the form of the Gulf of Mexico for the first time

On arrival he was placed in the indoctrination battalion shorn of his hair donned his denims and immediately started doubling and running in the manner appropriate to recruits During his first week he was given his induction physical and here the hospital corpsman recorded B P 80/45 pulse rate 72 The low pressure was thought to be due to a defective sphygmomanometer and was repeated using different machines and with increasing rank (up to captain) but his mean pressure remained 80–85/45 55

Further close questioning revealed that he had always had trouble with his nose in the form of catarrh and colds He was slightly smaller than his brothers but he was able to keep up during physical exercise He had not sniffered from fainting attacks dizzy spells fits he had had no breathlessness nor palpitations He had noticed on one or two occasions a feeling of light headedness on getting up from a chair after sitting for some time He had had no serious illness nor operations His family history revealed that his paternal grandparents were alive and well as were his own parents and several siblings He smoked about five cigarettes per diem

Examination revealed a lean man who was 5 ft 4 in tall He had some receding of his hair line All muscle groups were present and symmetrical The only abnormalities detected were his blood pressure in the range of systolic 70–80 diastolic 45 60 and a marked atrophic rhinitis His electrocardiograms at rest and including three and five minutes Harvard Step Test during a Valsalva manœuvre and on a tilt table were normal After a five minute Harvard Step Test his B P reached a peak figure of 97/60 X-ray of his chest was normal although the cardiac outline was smaller than expected X rays of the frontal and maxillary sinuses revealed chronic inflammation A resting E E G was within normal limits

The blood chemistry carried out was necessarily limited when it was obvious he would not be accepted for flying because of the atrophic rhinitis The haemoglobin-white cell count differential plasma protein bound iodine and arthrogenic index were within normal limits A 24-hour urinary ketosteroid excretion was within normal limits

In order to discover his tolerance to positive acceleration such as experienced while flying, he volunteered to be a subject in the School of Aviation Medicine

[illegible] be subjected to varying G forces. The attitude of the [illegible] of his sinus condition but it was possible to apply 4 G [illegible] two centrifuge runs. An E C G and E E G recorded during the maneuvers were within normal physiological limits. He apparently had a tolerance within the accepted average range to acceleration, probably indicating good cardiovascular reflexes.

Discussion

Raised blood pressure is a major problem in medicine; low blood pressure, apart from acute episodes, is a less-well defined entity. In adults the normal average systolic blood pressure is about 125–130 mm. Hg with a range of ± 15.[1] The level is 90–110 mm. Hg in childhood and 100–120 mm. at puberty. However, Robinson and Brucer[2] give as the range 90–120 mm. systolic, 60–80 diastolic. This apparently healthy man is outside this range and must therefore be considered either as a case of low blood pressure or be at the extreme range of normality. He did have G tolerance within the average range, and it was possible to raise his arterial pressure by exercise. This indicates normal cardio vascular reflexes. Physical examination, blood chemistry, E C G and E E G were within normal limits. It must be concluded therefore that this pressure was a normal variant.

Fortunately his nose condition was disqualifying for flying and the medical board did not have to argue about whether this low pressure would disqualify this man from embarking on a career as an aviator.

Summary

A case of low blood pressure with chronic atrophic rhinitis as the only physical finding as described.

ACKNOWLEDGMENTS

The author wishes to thank the Commanding Officer and Staff of the U. S. Naval School of Aviation Medicine, Pensacola, for the chance to see and examine this man, and in particular Lieutenant Commander R. A. Carleton, U.S.N., who did the cardiology work up.

[1] Wright's Applied Physiology, 9th Edition, 301.
[2] Robinson and Brucer, Arch. Int. Medicine, 1939, 64, 409.

COLD IMMERSION

By Surgeon Lieutenant P. CANNON, R.N.

[illegible] aims to outline some theoretical aspects of the physiology [illegible] cold water and to suggest their importance in deciding [illegible] problems of cold immersion.

The [illegible] physiological prerequisite of men immersed in water below body temperature is the maintenance of heat balance. The thermal conductivity of water is 23 times that of air and even in still water the body loses heat rapidly. Basal heat production is sufficient to equal heat loss in water at temperatures down to 33° C (91°F) but below this temperature if heat balance is to be achieved either heat production has to be increased or heat loss reduced by increasing body insulation. In man, both occur simultaneously (Cannon and Keatinge 1960).

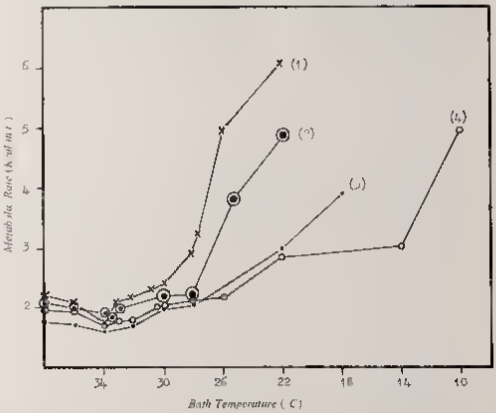


Fig. 1. The relation between water temperature and heat production of men immersed without clothing. Subjects 1 to 4 are numbered according to skin fold thickness (varies from 6·5 mm. for subject 1 to 26 mm. for subject 4).

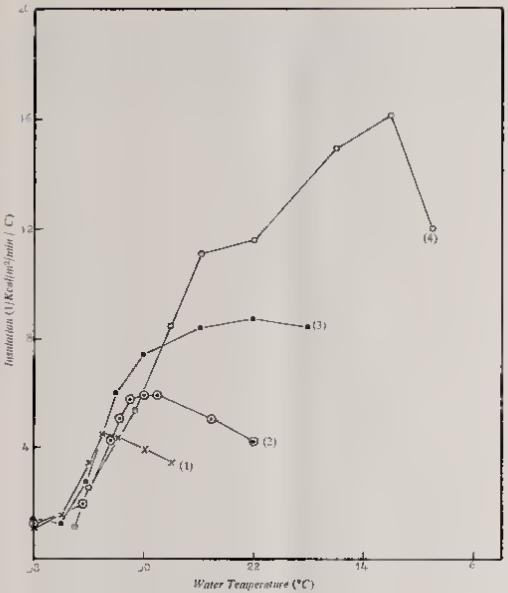


Fig. 2. The relation between water temperature and bodily insulation of men immersed without clothing. Subjects numbered as in Fig. 1.

Heat production is always increased (i.e. shivering commences) in water below 33°C whatever the insulation possessed by the individual in the form of subcutaneous fat although fat men show a much smaller rise in metabolic rate than thin men as water temperature is lowered (Fig. 1). Below 33°C as well as a rise in metabolic rate there is also vasoconstriction and heat loss is reduced. Fig. 2 shows that as water temperature is lowered the calculated insulation (i.e. the reciprocal of the rate of heat loss) rises to reach a peak the height of which is dependent on fat thickness but then with a further decrease in water temperature insulation falls.

Because [illegible] production in water below 33 C this has been called the critical temperature for [illegible] immersed in water (Scholander Hock Walters Johnson [illegible] 1950) The term was originally applied to animals which do not rise the heat production is the environmental temperature is lowered until body insulation has reached its maximum Its use as applied to man therefore is not strictly justified This confusion has led to a widespread misconception that man is a 'tropical' animal and not adapted to cold exposure whether in air or water Knowing the maximum insulation an individual is capable of achieving it is possible to calculate 'true critical temperature,' i e the lowest temperature at which thermal balance could theoretically be achieved without an increase in heat production This can be shown to vary from as high as 32 C in thin men to 22 C or lower in the fattest subjects and it is plain that fat men are well suited to immersion at least at moderately low water temperatures It is of interest also that man carries his insulation beneath the skin like the aquatic mammals rather than as fur which is plainly designed only for insulation in air since its properties are immediately destroyed by wetting

If heat loss from different sites is measured as bath temperature is lowered it is found that particularly over the limbs heat loss after falling initially increases again as shivering commences This increase coincides with the fall in general body insulation shown in Fig 2 Exertion in water produces the same increase in heat loss which in both cases is due to an increase in blood flow to the muscles This is the reason why exertion in water although it increases heat production and should theoretically aid in the maintenance of body temperature (Glaser 1950) never in fact does so A classical series of experiments by Keatinge (1959) has shown that work in water always produces an increase in the rate of fall of body temperature Thin men especially jeopardize their chances of surviving prolonged immersion if they exert themselves in a mistaken attempt to keep warm At moderate water temperatures e g around 15 C fat men are able to swim without disadvantage as shown by the performance of Channel swimmers since they have a large reserve of insulation at these temperatures (Pugh and Edholm 1955) and in a survival situation thin men would be well advised to leave tasks necessitating swimming to their fatter companions but at lower temperatures even fat men should swim hard only [illegible] it means that they are going to get out of the water more quickly However in a subject who remains still in cold water, cooling of the muscles results in a rapid reduction in strength and the ability to maintain a muscular contraction manual dexterity is reduced and the sense of touch is rapidly lost (Clark Hellon and Lind 1957) In certain circumstances therefore when it is known that rescue will occur in a short time (in less than 20 minutes for example) hard swimming may be beneficial in that it improves morale and enables a man to help himself more usefully on rescue

The fattest men even when immersed without clothing can achieve heat balance in water down to a temperature of 12 C (55 F) by vasoconstriction and by increasing their heat production but in more average subjects additional insulation is required at temperatures 5°C 10 C higher than this If clothing specifically designed for protection in cold water is not available normal everyday clothing can provide useful insulation It has been suggested on theoretical grounds that everyday clothing is

likely to have little practical value since clothes soaked in water provide much less insulation than if they are filled with air (Hervey 1955) but experimentally it can be shown that water immobilized in clothing does provide a useful amount of insulation (Keatinge 1961) It is clear, however that as soon as a man in water soaked clothing begins to move the insulation provided is largely destroyed Any movement by squeezing water from the clothing takes away heat very rapidly This is added reason for keeping still in water if prolonged immersion is inevitable, and even for short periods of immersion at lower temperatures clothed men are better off if they remain still Even in the fattest individual clothing becomes of vital importance in water below 12 C (55 F) At these temperatures blood vessels begin to show Lewis's "hunting" reaction (Lewis 1941) or cold vasodilatation Initial vasoconstriction is followed by a dilatation and blood flow returns to the skin Insulation is lost and heat loss rapidly increases This reaction is primarily designed to protect the surface tissues from cold injury and it is clear that under these conditions this takes precedence over maintenance of body temperature

Three other physiological problems which may affect the survival of men immersed in water are

(1) *Diuresis* A marked diuresis occurs during immersion due to a shift of blood from the periphery and increased central blood volume It has been suggested that the results of this diuresis are sufficiently deleterious to make flotation in the horizontal position preferable to the 45-degree angle of immersion adopted when a Mae West is worn The initial magnitude of this diuresis can be readily confirmed but our evidence suggests that it rapidly comes to a halt We have detected after 12 hours nothing but slight haemoconcentration and there appears to be little reason at present for condemning the Mae West especially in view of its many other advantages However because of this diuresis, the insulation of any protective clothing worn may be seriously reduced as the underclothing becomes soaked with urine unless this can be voided to the exterior

(2) *Sudden Death on Immersion* Cases are periodically reported of sudden death following immersion in cold water particularly after a heavy meal When cases of coronary thrombosis or drowning have been excluded there is often no evidence of the cause of death in these cases

In healthy young men sudden immersion causes increased venous and arterial pressure (Keatinge and McClance 1958) and the E C G often shows multiple ventricular extrasystoles (Keatinge and Evans, 1961) There are several factors producing this increase in ventricular excitability which in fatal cases could well result in ventricular fibrillation

An alternative explanation of these cases may lie in the sudden gasp given on immersion The stimulus to this is so powerful that it may occur when the head is below water and entry of cold water into the nasopharynx could lead to vasovagal cardiac arrest

(3) *Tissue Freezing* Lastly an interesting problem is suggested by the fact that sea water, which is hypertonic, freezes at —1 9°C whereas the freezing point of body tissues is more than a degree higher —0 5°C Normally the freezing of tissues in sea water is prevented by their ability to super cool readily (Lewis 1944)

This is a physico-chemical phenomenon where the temperature of a tissue falls below its freezing point without actual crystallization apparently occurring. Supercooling can readily be overcome by scratching, spraying or soaking the skin with fresh water and tissues have been shown to freeze in ice brine (Keatinge and Cannon 1960).

Immersion foot usually develops after a relatively prolonged period of immersion. However there are some reports that severe immersion injuries with subsequent gangrene have occurred after very brief immersion in near freezing sea water temperatures (Ungley, Channell and Richards 1945). The above experimental findings suggest that cold injury at these temperatures may possibly be complicated by actual freezing.

Summary

In water below 35° C the so called "critical temperature" the major physiological problem of man is the maintenance of heat balance. However although man has been classed as a "tropical" animal it can be shown that fat men are well adapted to immersion at least in moderately cold water. Heat balance is maintained by reducing heat loss by vasoconstriction and by increasing heat production by shivering. Average men need additional insulation in water below 15° C 20° C and the value of normal clothing in providing this is discussed. In water below 12°C cold vasodilatation effectively reduces the insulation even of the fattest men and clothing by preventing this becomes of vital importance. The copious diuresis which occurs on immersion may also account for some of the deterioration of immersed men.

Current views on the aetiology of sudden death on immersion are outlined and the possibility considered that freezing may contribute to immersion injury in near-freezing sea water the temperature of which is below the freezing point of body tissue.

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A REVIEW OF THE HIGH-ALTITUDE SELECTION TEST, 1961-1962

By Surgeon Lieutenant T R GOULD R N.

Introduction

During the 1940s a number of decompression tests were used by the Royal Naval Air Medical School on aircrew to determine their susceptibility to decompression sickness. These tests provided valuable information but there was no standard test. In 1951 a standard test was introduced and is still used at the present time.

The test consists of three one hour periods at 37 000 feet on alternate mornings in a week. All aircrew now do this test before they start flying training and are then retested at four yearly intervals. The subjects are categorized according to the results of the test.

Categorization

Three categories are used according to the type of disability suffered.

Category "A" — Minimal symptoms and signs such as "fleeting" aches in the joints, rash or pruritus not necessitating descent within the hour.

Category "B" — Moderate symptoms and signs such as pain in a joint ("bend") necessitating descent within the hour.

Category "C" — Major symptoms and signs such as pulmonary ("chokes") and neurological ("staggers") signs and symptoms necessitating immediate descent to ground level. Category "C" cases are never retested.

The future of the aircrew depends on the results of the test. Category "A" subjects are unlimited. Category "B" subjects are limited to 30 000 feet in an unpressurized aircraft, but today as all Naval aircraft are pressurized these categories are for practical purposes identical. Category "C" cases are limited to 30 000 feet whether pressurized or unpressurized.

Results of the High Altitude Selection Test 1961-1962

In 1961 and 1962 there were 357 subjects tested at 37 000 feet for high altitude selection. The results are shown in Table 1.

Table 1

Category "A"	224 subjects (61·7%)
Category "B"	115 subjects (33·2%)
Category "C"	18 subjects (5·1%)

Of these 357 subjects 223 were doing their first High Altitude Selection Test. The results for these are shown in Table 2.

TABLE 2

Category A	159 subjects (71)
Category B	54 subjects (24 2)
Category C	10 subjects (4 5)
TOTAL	223 subjects

One hundred and ten subjects were doing their second High Altitude Test The results for both their tests at a four year interval are shown in Table 3 No Category C case is retested Therefore none appear in the first part of the Table

TABLE 3

1st H A S T	
Category A	80 subjects (72 7)
Category B	30 subjects (27 3)
TOTAL	110 subjects
2nd H A S T	
Category A	54 subjects (49 1)
Category B	50 subjects (45 4)
Category C	6 subjects (5 5)
TOTAL	110 subjects

The remaining 24 subjects were doing their third High-Altitude Test over a period of eight years The results for these tests are shown in Table 4

TABLE 4

1st H A S T	
Category A	15 subjects (62 5)
Category B	9 subjects (37 5)
TOTAL	24 subjects
2nd H A S T	
Category A	11 subjects (45-8)
Category B	13 subjects (54 2)
TOTAL	24 subjects
3rd H A S T	
Category A	11 subjects (45 8)
Category B	11 subjects (45 8)
Category C	2 subjects (8 4)
TOTAL	24 subjects

Discussion

To avoid the hazards of decompression sickness in aviators two measures can be taken One, preoxygenization for four hours will eliminate enough nitrogen from the body to give protection up to 40 000 feet and secondly a High Altitude Selection Test

The first method is costly in both time and oxygen and would be quite difficult in an operational programme. The second method is by no means foolproof as it is impossible to predict any one aviator's susceptibility to decompression sickness on any one day However the High-Altitude Selection Test does help towards the problem of eliminating any subject who is likely to suffer from the severer forms of decompression sickness at altitude

Many decompression tests have been used and certain predisposing factors have come to light

1 *Incidence with Age*

The 357 subjects for H A S T were divided into age groups as shown in Table 5

TABLE 5

Age	*Cases*	*Category "A"*	*Category "B"*	*Category "C"*
17-20	82	63 (76 8%)	16 (19 5%)	3 (3 7%)
21 24	130	92 (70 7%)	33 (25 3%)	5 (4 0%)
25 28	67	42 (62 6%)	24 (35 8%)	1 (1 6%)
29-32	30	13 (44 3%)	14 (46 6%)	3 (9 1%)
33-36	26	8 (30 7%)	15 (57 7%)	3 (11 6%)
37 40	16	5 (31 2%)	9 (56 2%)	2 (12 6%)
41-44	4	1 (25 0%)	3 (75 0%)	0 (0 0%)
45 48	2	0 (0 0%)	1 (50 0%)	1 (50 0%)

Table 5 reveals one or two interesting facts There is obviously a correlation between age and susceptibility as shown in the gradual decrease of Category "A" and increase of Category "B" subjects The table also suggests that the age of about 28 is critical and from then on susceptibility increases farther

Category "C" cases are eliminated from the high altitude programme at the start of their flying training and are not retested Again at the age of 28 there appears to be an increase in the incidence of decompression sickness This series is small but the general impression appears to agree with previous work reported by J S Gray (1951)

2 *Incidence with Overweight Subjects*

The 357 subjects were divided into groups of overweight and underweight with reference to Life Insurance Tables The results are shown in Table 6

TABLE 6

	Category "A"	*Category "B"*	*Category "C"*
15 per cent overweight	35 (54 7%)	22 (34 4%)	7 (10 9%)
7½ per cent overweight	43 (59 7%)	22 (30 6%)	7 (9 1%)
Average	126 (66 0%)	61 (31 9%)	4 (2 1%)
7½ per cent underweight	22 (70 9%)	9 (29 1%)	—
15 per cent underweight	2	1	—

This table does not provide any conclusive evidence that there is an increase in incidence with overweight subjects apart from the fact that all the Category 'C' subjects were not underweight. J. S. Gray (1951) has shown that there appears to be an increase in incidence when plotted against the linear density.

Conclusion

Bearing the predisposing factors of age and possibly overweight in mind it is still impossible to predict any one subject's susceptibility to decompression sickness. Whilst this problem remains the need for a High Altitude Selection Test is still considered to be valuable for the selection of aircrew.

Summary

A review of the Royal Naval High-Altitude Selection Test and a discussion for the test in 1961 and 1962.

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UNDERWATER EJECTION

By Surgeon Lieutenant-Commander A. F. DAVIDSON, R.N.

In 1960 at the Annual Aero Medical Symposium underwater escape from aircraft was discussed in detail. The paper presented at that time explained the advantages of a compressed air system compared with a cartridge-operated system for propulsion of an ejection seat underwater. The most important of these is the lack of blast when the inner piston separates from the ejection gun.

In the last two years the main developments have been in methods of separation of the subject from the seat after the seat has been fired. Two systems have been investigated:

1. The Buccaneer system which provides automatic triggering and automatic separation and inflation of the life jacket.
2. The Sea Vixen system which gives automatic separation and life jacket inflation and can also have an automatic dinghy.

The basic principle in both systems is the same—AUTOMATIC SEPARATION OF THE SUBJECT FROM THE SEAT.

Both the Buccaneer and the Sea Vixen systems use inflatable bags under the dinghy pack and behind the parachute pack to push the crew member out of his seat. In both the systems the barostatic time-release unit is now the triggering mechanism for the inflation cylinder. But in the Buccaneer it is operated by the harness unlocking plunger while the Sea Vixen system uses a short cable attached to the transverse bar of the harness unlocking linkage. The Sea Vixen system can therefore be actuated by pulling the manual override handle in addition to the normal automatic sequence.

The life-jacket actuation in the Buccaneer system is by compressed air from the main cylinder which is led through the personal equipment connector to the pressure sensitive operating head of its CO_2 bottle. On the other hand the Sea Vixen system triggers its life-jacket CO_2 bottle by a linkage from the seat cushion inflation cylinder. Thus means that using the Sea Vixen system the life jacket will inflate following separation from the seat during aerial ejection as well as underwater while the Buccaneer system inflates the life jacket only during underwater escape.

Both systems rely on a guillotine to cut the parachute withdrawal line which enables the crew member to separate from the seat underwater without deploying the parachute.

Underwater it is particularly difficult to unfasten the combined safety and parachute harness and leave the seat. There are no separating forces to free the dinghy pack from the seat pan and experiments have shown that even a trained subject is likely to sink to a considerable depth while struggling in the seat.

The automatic system requires

1 A means of disconnecting the parachute withdrawal line
2 A positive seat separation system
3 Life jacket unto inflation

If these three items are provided firing of the ejection seat should ensure that the crew member reaches the surface

The Sea Vixen equipment was tested at Glen Ernin in April 1962 In this series 16 shots were carried out from an A frame with successful separation in every case In October and November a further series of trials took place with the system fitted to a Sea Vixen fuselage This system is a relatively low pressure one and relies on successful canopy jettison but during the trial whenever the canopy and hatch had jettisoned the subject always reached the surface In several shots the seat pushed the unlocked canopy clear of the ejection path It provided a very smooth and comfortable ride for the subject As it has been designed specifically for the Sea Vixen there is no possibility of through canopy operation

The Buccaneer system is a high-pressure system developed for the Buccaneer It has been designed with the intention of ejecting through the canopy In June 1962 the first trials were carried out at H M S *Vernon* using a Seahawk cockpit Several snags were discovered in the separation system but after two satisfactory live shots (without canopy) and two dummy shots through the canopy in which no damage to the dummies was discovered it was decided to undertake a live through canopy shot This shot was carried out using the aircraft oxygen breathing equipment for the subject Everything worked satisfactorily and the experiment was repeated in the Scimitar during the Aircraft Sink Rate trials at Toulon in August with a dummy This produced an equally successful result

From September to November further trials were conducted with the system in a Buccaneer cockpit The increase in the thickness of the canopy from $\frac{5}{8}$ in in the Seahawk and Scimitar to $\frac{3}{4}$ in in the Buccaneer produced dramatic results In the first seven shots the seat had some difficulty in penetration of the canopy with in most cases a long delay half way through it In the seventh shot the seat stopped with only the drogue container through the canopy and the dummy doubled up inside the cockpit Examination of the dummy after this trial showed that its neck had been broken

A marked lack of reliability in the separation system was also demonstrated and consequently it was necessary to change the triggering system for the inflation of the seat cushions under the dinghy pack and behind the parachute When this was triggered by the barostatic time-release unit, as had been tried successfully in the previous Sea Vixen trials no further difficulty was experienced

The attempts to produce satisfactory penetration of the canopy have still failed to produce a solution to this problem The present system while it succeeds in pushing the seat through the canopy has still not provided the crew member with adequate protection against possible injury to the head and neck The greatest danger is believed to be the chance of cervical injury due to the forward movement of the unrestrained head before it strikes the canopy and the load applied to it during canopy penetration

In its present configuration the system is satisfactory for fitting to the Buccaneer provided that the aircrew understand the importance of jettisoning the canopy before water entry

Automatic Firing of the Ejection Seat

If the crew member is unconscious or dazed automatic firing is the only hope If however the crew member is conscious the delay in firing would be very disconcerting if the aircraft sank slowly It would therefore be an advantage to supplement the automatic with some form of override which would enable the crew to fire the seat manually particularly if they had already removed the canopy

Head Restraint

As the main hazard appears to be cervical injury during canopy penetration it is reasonable to suppose that introduction of a suitable form of head restraint would improve the chances of survival On firing the seat the head would have to be pulled quickly back against the catapult cushion and the restraint system would have to be released probably by a guillotine at the same time as the rest of the seat attachments, as part of the separation sequence

Naturally further work must be done to investigate methods of fracturing the canopy and so eliminate the excessive loads which can be applied to the head and neck during canopy penetration by the present system

ACKNOWLEDGMENTS

These underwater ejection trials were carried out by the Institute of Aviation Medicine with the assistance of the Mechanical Engineering Department R A E

The trials were made possible by the enthusiastic co-operation of the Martin-Baker Company and the Walter Kidde Company who each provided and serviced their own equipment

I also thank the Instrument and Ranges Division of the R A E for their excellent photographic coverage of the experiments

I am grateful to the Officer Commanding Royal Air Force Institute of Aviation Medicine, for permission to publish this report

NAVAL MEDICAL

ACCOUNTS OF RECEIPTS AND PAYMENTS

	£ s d	£ s d
Balance at Bank on 31st December 1961		
Current Account	1 409 11 8	
Deposit Account	13 2 6	
		1 422 13 9
Interest on 3½% Conversion Stock	66 10 0	
Interest on 4% Consolidated Stock	179 18 6	
Interest on 3½% War Stock	35 0 0	
Interest on 4½% Conversion Stock 1964	225 0 0	
Interest on 4½% Conversion Stock 1962	13 13 5	
Interest on Loan No 623 to Walthamstow Corporation	28 16 7	
Interest on Loan No 623 to Walthamstow Corporation	9 8 4	
		558 6 10
Interest on Deposit Account		7 4
Refund of Income Tax on Deeds of Covenant	92 17 3	
Refund of Income Tax on 4½% Conversion Stock	87 3 8	
		180 0 11
Redemption of 4½% Conversion Stock 1962		992 0 0
Redemption of Loan No 623 to Walthamstow Corporation		2 001 13 3
Subscriptions		228 18 0
Donations		4 4 0
Mid Market price of Stock transferred to U S T C C F w e f 31 October 1962		
4% Consolidated Stock	3 081 4 9	
3½% War Stock	605 0 0	
3½% Conversion Stock 1961/A	1 149 10 0	
4½% Conversion Stock 1964	5 025 0 0	
	9 860 14 9	
Less Gross accrued interest on Conversion 4½% Stock, 1964	8 12 7	
	9 852 2 2	
Less Balance repaid to N M C F by U S T	16 8	
		9 851 5 6
Balance of Purchase Price repaid to N M C F by U S T		16 8
		£15 240 6 3

I certify that I have examined the above Account of Receipts and Payments and found it to be correct and in accordance with the books and records of the Fund and that all my requirements as Auditor have been met.

A certificate of the Balances on Current and Deposit Accounts at the National Provincial Bank Limited on 31st December 1962, is attached together with a certificate by The United Services Trustee of the number of Shares in The United Services Combined Charitable Fund held on behalf of the Fund at that date

The Balance of £830 10s 4d on Current Account includes the sum of £18 18s 0d awaiting investment on account of the Donation Fund

Subscriptions received during the year include the sum of £1 1s 0d in arrear for the previous year

Subscriptions amounting to £7 7s 0d in respect of 1962 were unpaid at 31st December 1962

9th February 1963

(*Signed*) WM C McNICOL,
Chartered Accountant Auditor

COMPASSIONATE FUND
FOR THE YEAR ENDED 31st DECEMBER, 1962

	£	s	d	£	s	d
Awards to Widows and Orphans	505	0	0	505	0	0
Clerical Assistance				30	0	0
Auditor				3	3	0
Stationery and Postage				3	14	9
Loan to the Walthamstow Corporation at 6½% p.a.				2 000	0	0
Purchase of 11 698 U S T C C F Shares of Total Nett Value	11 817	18	2			
Press Notices inserted by the U S T	1	10	0			
Brokerage	25	0	5			
Difference between Mid-Market price and Dealing price	10	0	2			
				11 854	8	9
Balance at Bank on 31st December 1962 —						
Current Account	830	10	4			
Deposit Account	13	9	5			
				843	19	9
				£15 240	6	3

In addition to the above Cash Balance, 11 698 Shares were held by the United Services Trustee Combined Charitable Fund at the close of business on 31st December 1962, on behalf of the Trustees of the Naval Medical Compassionate Fund (C C F 767)

30th January 1963

(*Signed*) M. H. ADAMS,
Surgeon Captain R.N.
Honorary Treasurer

Articles

AGEING IN THE ROYAL NAVY

By Surgeon Lieutenant-Commander W B WRIGHT, R N

PART III—CHAPTER III

Results

'Most of the critical things in life which become the starting points of human destiny are little things ' (R Smith)

Grey Hair

THREE hundred and thirty-two (332) Naval ratings and 277 civilians were examined for the presence of grey hair, as in Table II (For the purposes of this table and graph, anything from definite greying at the temples was regarded as positive)

TABLE II

	NAVY			CIVILIAN		
Age	No	Grey	%	No	Grey	%
25–	105	6	5 7	35	1	2 8
30–	79	24	30 4	33	4	12 1
35	72	54	75 0	51	13	25 9
40–	76	63	83·0	49	25	51 0
45	No Naval figures available			6 t	46	75 4
50–55	No Naval figures available			48	43	89 2
TOTALS	332			277		

It will be noted from the table that, whereas 75 per cent of the ratings have at least early temporal greying by 35–40 a comparative incidence is reached by the civilians only after a further 10 years i e at 40–45

The difference in rates of incidence is better appreciated on the graph (Fig II)

At 35–40 and 40–45 the differences are statistically highly significant (S—30 40 P— 00001 and S—16 23 P— 00006) respectively

Arcus Senilis

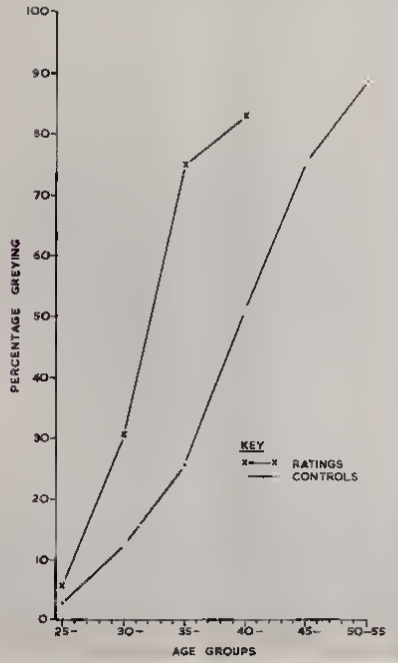
Three hundred and thirty-two Naval ratings were compared with 276 civilians in respect of the age incidence of arcus senilis

The results are presented in Table III

37

FIG. II

INCIDENCE OF GREYING OF HAIR IN THE R.N. COMPARED WITH A CONTROL GROUP



39

FIG III

GRAPHIC INCIDENCE OF ARCUS IN RATINGS AND CIVILIANS.

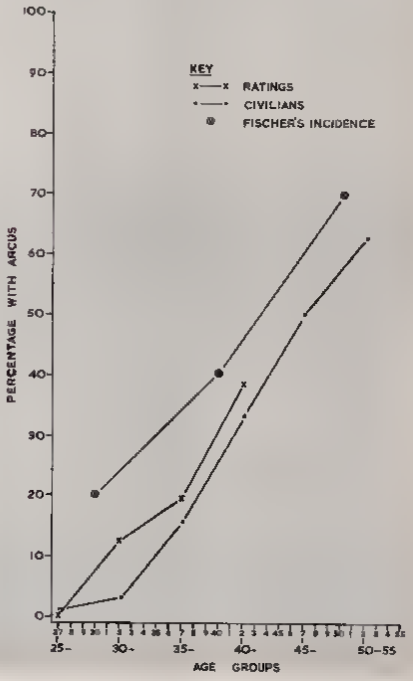


TABLE III
Incidence of arcus in ratings and civilians

NAVAL				CIVILIAN		
Age	No.	Arcus	%	No.	Arcus	%
25–	105	1	1·0	35	1	2·9
30	79	10	12·6	33	1	3·0
35	72	14	19·4	51	8	15·7
40	76	29	38·2	48	16	33·3
45	No Naval figures available			61	30	50·0
50–55	No Naval figures available			48	30	62·5

It will be noted from the table that no marked difference in incidence was apparent. The similarity is well seen in the graph (Fig. III).

The curve obtained by Fischer (1941) is superimposed. He used a slit-lamp and magnifying lens to examine his subjects. This undoubtedly explains his higher figures in each age group. The difference is fairly constant, however, and the direction of the curves agrees very well.

Range of Accommodation

This index was measured according to the method already described in 291 ratings. The result in dioptres is depicted in the form of a scattergram in Fig. IV. In spite of the scatter of results, the general trend is quite clearly a steady decline.

The average range in dioptres, in successive five year age-groups, compared with the corresponding figures of Duane (1906) and Donders (1864) is shown below in Table IV; the same figures have been graphically superimposed in the scattergram.

TABLE IV
Mean range of accommodation in successive age groups

Age	25	30–	35–	40	45–50	
Present Series	9·4	7·6	6·4	4·8	—	dioptres
Donders	9·7	7·8	6·0	4·8	3·7	"
Duane	10·0	8·8	7·0	6·0	4·0	"

(NOTE. The age-group 45–50 does not exist for practical purposes among Naval ratings, as explained earlier.)

It is at once apparent that the present series follows Donders' findings very closely (N.B. The test point was small print in both, whereas an engraved line was used by Duane), and it is also clear that the ocular lenses of the ratings have not been subject

to more rapid degeneration than the standard average set by these authors If the graph is studied it will be noticed that the slope of the present average readings is parallel to that of the other two This and the consistent approximation to Donders graph would suggest that the present simple method of obtaining the figure of range of accommodation has proved itself quite sufficiently accurate for the present group study

Campbell de Morgan's spots

The incidence of Campbell de Morgan's spots in the examination of 332 ratings is presented in the table below (Table V)

TABLE V

Incidence of Campbell de Morgan's spots

Age	No	Spots present	%
25–	105	9	8 6
30–	79	14	17 7
35	72	17	23 6
40–45	76	36	47 4

the figure (Fig IV) shows these results in graphic form Murison's incidence is also shown for comparison Apart from the sharp rise at 40–45 the present series shows a smaller incidence than his but the difference is not very great

Nocturia

Only 20 of 332 ratings admitted having to get up at night as a rule to piss water as in Table VI

TABLE VI

Age	No	Nocturia	%
25	105	6	6
30–	79	5	6
35	72	4	5
40	76	5	6

It is obvious from the table that ratings under 45 do not normally complain of nocturia Possibly the symptom was being concealed in spite of careful phraseology but I think this is unlikely This symptom as a group phenomenon might well begin to emerge from 45 onwards Consequently nocturia proved unsuitable for an index of ageing in the Navy Indeed if a rating should admit to nocturia on casual questioning this investigation would suggest that it would be worth while investigating the matter as a deviation from the normal

41

FIG IV

RANGE OF ACCOMMODATION IN RELATION TO AGE

SCATTERGRAM OF 291 RATINGS

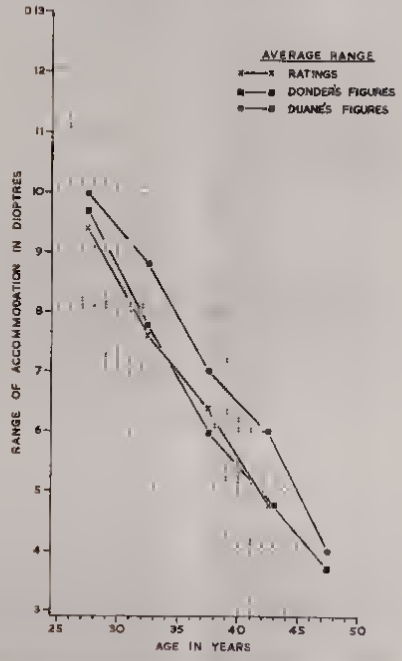
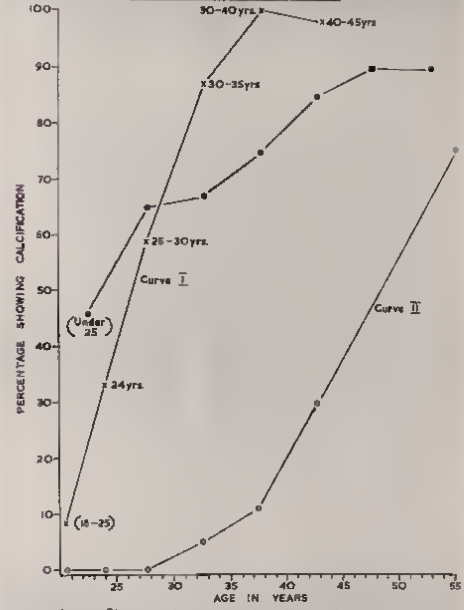


FIG V

INCIDENCE OF COSTAL CARTILAGE CALCIFICATION IN RELATION TO AGEING IN THE R.N.



Curve I x—x % cases showing any costal cartilage calcification (including 1st rib)

Curve II o—o % cases showing any costal cartilage calcification (excluding 1st rib)

o--o Fischer's incidence of costal cartilage calcification (excluding 1st rib)

N B The highest point of the 2nd curve is only in an approximate position it should be at 37.5 years

Calcification of Costal Cartilages

Over 1 000 100 mm X-ray films were scrutinized for evidence of costal cartilage calcification Results are presented in Table VII and Fig V

TABLE VII

Incidence of costal cartilage calcification in the R N

Age	Total	No Calcification	%	Only 1st Rib Calcifying	%	1st and Other Ribs Calcifying	
Under 24	317	300	96	17	4	0	0
24*	42	28	67	14	33	0	0
All under 25	359	328	91 4	31	8 6	0	0
25–	244	100	41	144	59	0	0
30	142	18	13	116	82	8	5
35	85	0	0	76	89	6	11
40–45	95	2	2	65	68	27	30
Over 50†	108	0	0	27	25	81	75

*Particular attention has been paid here to ratings of 24 years because as can be seen the incidence of costal cartilage calcification rises sharply at this particular age

†All civilian employees over 50 are asked to have routine X-rays because of the high tuberculosis incidence in this age group A proportion of this population consists of ex Servicemen. Ages ranged from 50-65

The incidence of costal cartilage calcification (excluding the 1st rib) which Fischer (1955) found in his series of male subjects, is superimposed on Fig V for comparison with Curve II It will at once be seen that these curves do not resemble each other in any respect Fischer's curve begins higher ends higher and the slope is quite different This considerable disagreement in results must be due mainly to the fact that we are not comparing like with like. He was using full plates for scrutiny whereas we had access to 100 mm film only It is quite possible that early calcification in the lower zones could be missed on a small film Nevertheless his finding of 46 per cent calcification in ribs other than the first under the age of 25 is astounding in view of the complete absence of such calcification in any of our ratings under 30 Although our films were so much smaller calcification is very unlikely to have been missed in the 1st rib junctions of our younger ratings because this rib's sternocostal junction is so much less obscured by mediastinal shadows than the others Consequently our figures for this rib should correspond closely with his (not specifically mentioned) Our incidence of chondral calcification on the 1st rib under 25 among 359 ratings, was 8 6 per cent His incidence of calcification elsewhere is 46 per cent in this age-group This would imply that in his series roughly 30 per cent of this young group had calcification elsewhere *before* calcification of the 1st costal cartilages Indeed he states 'With extensive calcifiention of all the other cartilages the 1st

rib can be free [illegible] and the other way round Yet we never saw calcification else where preceding calcification in the 1st rib in a single case!

As already noted his graph does not even run parallel to ours which might have been expected if the difference was due to observer error because of the different methods of examination These snags make it evident that two series cannot be used comparatively It is worth noting however that our semi civilian group over 50 is entirely in keeping with the trend shown in the rest of the graph which suggests that the standard of our own observations was consistent There is no evidence here of accelerated calcification among Naval ratings For practical purposes it would seem that the possibility need not be pursued further

Some useful inferences can incidentally be drawn from the present study viz. the presence of calcification in the 1st rib cartilage on a 100 mm X-ray film implies that the rating is at least 24 The presence of additional calcification elsewhere makes it likely that he is at least 40

Life Expectancy

In reviewing all the pensioner death certificates for 1959 a total of 2 036 were examined The number dying in each age-group was ascertained and the figures are as set out in Table VIII

TABLE VIII

Total deaths in 1959 *at each age among* 2 036 *ex-Naval pensioners*

Age	No	Age	No	Age	No	Age	No	Age	No
40	1	50	9	60	43	70	67	80	70
41	2	51	4	61	38	71	46	81	68
42	2	52	20	62	53	72	72	82	55
43	1	53	21	63	62	73	61	83	53
44	0	54	26	64	70	74	83	84	54
45	4	55	26	65	65	75	84	85	38
46	8	56	23	66	65	76	72	86	32
47	6	57	37	67	55	77	78	87	26
48	10	58	40	68	49	78	71	88	22
49	19	59	44	69	56	79	85	89	16

(NOTE There were 33 deaths over 90 years of age)

The following facts were obtained later

1	Number of deaths in 1960	1 050
2	Total new pensioners enrolled 1959	1 085
3	Total new pensioners enrolled 1960	1 551

In mid 1961 a fiftieth sample of the population was obtained by the method previously described (See table IX)

TABLE IX

Fiftieth sample of living ex-Servicemen arranged according to age

Age	No	Age	No	Age	No	Age	No	Age	No
40	11	50	31	60	45	70	19	80	10
41	24	51	41	61	46	71	22	81	11
42	13	52	45	62	51	72	25	82	13
43	23	53	36	63	36	73	14	83	7
44	19	54	34	64	31	74	19	84	9
45	20	55	30	65	35	75	19	85	4
46	23	56	43	66	43	76	19	86	3
47	23	57	35	67	39	77	18	87	3
48	13	58	34	68	32	78	15	88	1
49	29	59	32	69	31	79	16	89	1

(NOTE. Three names were recorded as alive over 101)

The total number of the fiftieth sample was 1 204

Multiplying this figure by 50 we obtain an expected population of 60 200

The actual number of living pensioners at the time of this survey was 61 881 which is covered to the nearest 100

The constructed figure for population is therefore correct to within about 1 to 2 per cent

To find the life expectancy of ratings at age 40 the following steps were taken

1 *Reconstruction of the mid 1959 population from existing population*

(a) Those alive aged 40 and 41 in 1961 were discarded since they would not have been part of the ex-Service population in 1959

(b) Since the rest of the present population would have been two years younger two years is subtracted from each age group (e.g. 26 men aged 54 would become 26 men aged 52)

(c) Add those who died in 1960 since they were all alive in 1959 (One year must be subtracted from the age of each.)

To find out who died in 1960 the following method was used It was assumed that people died in the same age-group proportions as in 1959 Thus the following formula could be applied to the 1959 age group

$$\frac{\text{Total deaths in 1960}}{\text{Total deaths in 1959}} \quad \text{No. of deaths in each year group}$$

(d) Add half of those who died in 1959 (Half of those dying in 1959 would have been alive in mid-year.)

The calculation of 1959 population proceeded thus

Age	Calculation				Population
	(b)	(c)		(d)	
40	13	$50+(\frac{1950}{2036}\times 2)+(\frac{1}{2}$		$1)$	652
41	23	$50-(0\cdot 9577\times 2)-(\frac{1}{2}$		$2)-$	1153
42	19	$50-(0\cdot 9577\times 1)+(\frac{1}{2}$		$2)-$	952

Continuing in this way the whole of the living population was obtained

2. The death rate was then applied to this population and the percentage of death rate in each group was obtained as in Table X

3 These mortality rates were now applied to a hypothetical population of 100 000 men beginning at the age of 40 These men were subjected to the annual pensioner mortality rates of each year thereafter until half of them were dead

Beyond this age any one of the 100 000 who started at 40 would have more chance of being dead than alive he would therefore have proceeded beyond his life expectancy at 40 (the figure we wished to find) The principle is applied in Table XI

Over 72 years more would have died than remained alive It will be seen that the average life expectancy is therefore 32 years from retirement at 40 This figure is in keeping with those for the population at large (Stieglitz 1954)

Summary

Between ratings and civilians, a marked difference in the rate of hair greying was found the ratings showing temporal greying much earlier

No difference was found in the incidence of arcus senilis

There was no difference in the change of range of accommodation

The incidence of Campbell de Morgan's spots was the same

Nocturia did not arise as a regular symptom in the age-group studied

Costal cartilage calcification occurred early and consistently in the first rib There was a slow increase in calcification elsewhere such that it was normally present over the age of 40

Contrary to the implications of the Registrar General's occupational mortality statistics (1951) there was no evidence of a reduced life expectancy among Naval pensioners

TABLE X

Percentage of Naval pensioner population dying in each age group

Age	Total	Deaths	% Pop	Age	Total	Deaths	% Pop
40	652	1	0 155	65	2045	65	3 18
41	1153	2	0 173	66	1686	65	3 85
42	952	2	0 209	67	1619	55	3 40
43	1000	1	0-100	68	1028	48	4-86
44	1154	0	0 000	69	1192	56	4 70
45	1159	4	0 34	70	1328	67	5 04
46	660	8	1 21	71	792	46	5 85
47	1463	6	0 41	72	1045	72	6 89
48	1573	10	0 64	73	1061	61	5 75
49	2067	19	0 92	74	1072	83	7 74
50	2259	9	0 39	75	1011	84	8 31
51	1821	4	0 22	76	861	72	8 36
52	1729	20	1 15	77	907	78	8 60
53	1535	21	1 37	78	617	71	11 50
54	2188	26	1 19	79	660	85	12 86
55	1785	26	1 46	80	750	70	9 32
56	1748	23	1 32	81	437	68	15 50
57	1655	36	2 23	82	529	55	10 39
58	2312	40	1 73	83	278	53	19 05
59	2363	44	1 86	84	214	54	25 02
60	2600	33	1 65	85	200	38	19 00
61	1870	38	2 03	86	91	32	35 10
62	1636	53	3 27	87	84	26	30 90
63	1848	62	3 35				
64	2248	70	3 11				

TABLE XI

Life expectancy of 100 000 men aged 40 subject to Naval pensioner mortality rates

Age	Number Alive	Mortality		Remainder
40	100,000	0 155 ‰	155	99 845
41	99 845	0 173	172	99 660
42	99 660	0 209 ‰	208	99 452
43	99 452	0 099 ‰	12	99 440
44	99 440	0 00 ‰	0	99 440
45	99 440	0 34	338	99 102
46	99 102	1 21 ‰	1 200	97,902
47	97 902	0 41 ‰	402	97 500
48	97 500	0 64 ‰	620	96 880
49	96 880	0 92	892	95 988
50	95 988	0 39 ‰	374	95 614
51	95 614	0 22 ‰	211	95 403
52	95 403	1 15 ‰	1 103	94 300
53	94 300	1 366	1 290	93 010
54	93 010	1 19 ‰	1 110	91 900
55	91 900	1 46	1 340	90 560
56	90 560	1 32 ‰	1 200	89 360
57	89 360	2 23 ‰	2 000	87 360
58	87 360	1 73 ‰	1 510	85 750
59	85 750	1 86 ‰	1 600	84 150
60	84 150	1 65 ‰	1 390	82,760
61	82,760	2 03 ‰	1 580	81 180
62	81 180	3 27 ‰	2 660	78 520
63	78 520	3 35 ‰	2 630	75 990
64	75 990	3 11	2 360	73 630
65	73 630	3 18 ‰	2 340	71 290
66	71 290	3 85 ‰	2 750	68 540
67	68 540	3 40 ‰	2 330	66,210
68	66 210	4 56 ‰	3 220	62 990
69	62,990	4 70 ‰	2 960	60 030
70	60,030	5 04 ‰	3 030	57 000
71	57 000	5 85 ‰	3 330	53 670
72	53 670	6 89 ‰	3 690	49 020

THE MEDICAL LIBRARY, RDYAL NAVAL HOSPITAL, PLYMOUTH

By Surgeon Captain B S LEWIS, R N

It was decided in the bicentenary year (1962) of the Royal Naval Hospital Plymouth completely to reorganize recatalogue and rehabilitate the Medical Library with a view to making it an active part of the medical facilities of the hospital

To this end a committee of three Naval medical officers was appointed by the Medical Officer in Charge Surgeon Rear Admiral J Mansel Reese to investigate the existing situation and work was begun on the 25th June 1962

It was apparent from the outset that the Library was of considerable antiquity and great interest and included books dating back to the early 17th Century many beautifully illustrated in colour

The origins of this Library remain wrapped in profound mystery despite an intensive search for documents receipts or lists referring in any way to books or periodicals received

The first definite record is in a Register of Books received into the Library and dated 27th October 1871 with the added superscription "Books bound during period of a/c M D G order 15th April 1890"

The first entries are over the initials "R U" who remained in charge until 1880 when "J W R" took over until 1st August 1888, when "J M D" the last signatory carried on till 1899 It has not proved possible to identify these librarians but it is certain that they were not the S R A s secretaries for the period or hospital medical officers as names with these initials do not appear in the Navy List of that date From this Register however, it is known that periodicals were purchased regularly and bound in fine leather covers once a year at a cost of about £10

The earliest of these series is the *Journal of Natural Philosophy Chemistry and the Arts* commencing at Volume 1 in 1802 and following closely after this is the *Edinburgh Medical and Surgical Journal* in 1805 *Medico Chirugical Transactions* appear in 1815 and there is a "Medical Register" dated 1809 It seems probable therefore that the "official" Library was started about the turn of the 18th Century when the hospital was commanded by an executive Captain the celebrated Captain Creyke but it was not until about 1830 that the number of incoming periodicals hospital reports and general and special textbooks formed a real nucleus for a working Library of the period

It is remarkable how many of the books of that time were written in Latin and French and even the occasional philosophical volume in Greek can be found

The *Lancet* arrived in 1837 and exists as a bound unbroken series of Victorian medical literature over a period of 62 years On the whole it compares quite favourably with its present day version in pomposity and obscurity of diction

Braithwaite's *Retrospect of Medicine* rather similar to the present *Medical Journal* commenced in 1840—contemporary with Penny Postage—but lasted for 61 years

The time span covered by *Health of the Navy* is even greater 1830-1897 but alas! there are gaps in the record It is of interest to note that the layout then used was much the same as that employed today but the names of places visited and the long list of Naval hospitals and sick quarters—Haslar Plymouth Great Yarmouth Haulbowline Chatham Walmer Sheerness Malta Bermuda, Jamaica, Ascension Cape of Good Hope Hong Kong Yokohama Lisbon Esquimault—makes the chairborne Home Servicer's ' mouth water

Due to the absence of early records it is often difficult to discover whence some of the older books of the 17th and 18th Centuries originated They were probably gifts from individual medical officers and may well have been inspired by the most generous benefactions of Dr John Gillespie (seniority 1804) and Dr William McKinnall (seniority 1815) who bequeathed libraries of 600 and 400 volumes respectively

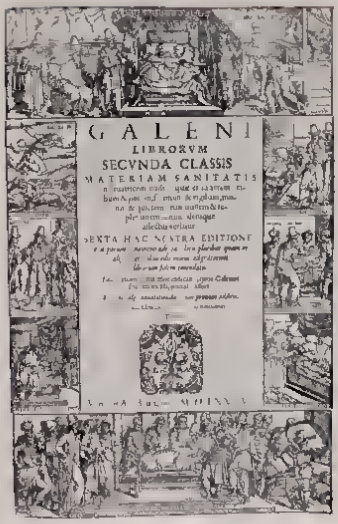
In one of these there is inscribed on the title pages "To my friend Dr Gillespie from William McKinnal August 10th 1832 " So it would seem that despite the wide disparity in seniority these bibliophiles may well have been partners in the work of making Royal Naval Hospital Plymouth Library one of interest and prestige

The site of the Library in its early years is unknown but for many years it was in the Patients Concert Room now the Central Duty Office in Trafalgar block and was known to be there in 1915 This seems a curious locale but there is still one hospital employee Mr Kingswell of the Surgeon Rear Admiral's office who had dealings with it and to whom I am indebted for much information He says that even then it was hardly ever used and no one took any apparent interest in the preservation of the more valuable books The Library in those days was stowed in handsome tall black bookcases picked out with gold lines and with glass fronts and Mr Kingswell clearly remembers the periodical mustering of the books by the Surgeon Rear Admiral's secretary whose duty it then was In 1935 it was transferred to an outhouse on the jetty beside Stonehouse Creek and from there to a pavilion between "B" and 'C ' blocks during the late war There it had a near miss from a bomb and, as evidence of this misadventure in Volume 36 of *Edinburgh Medical Journal* 1891 there remains a bomb-splinter embedded in the book

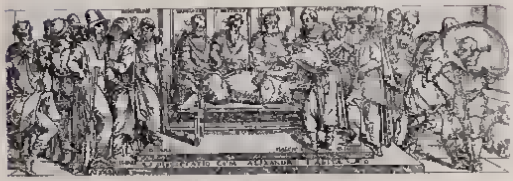
Because of this damage the Library was then transferred to the gallery of E 3 Ward and it is thought that most of the volumes missing from ' sets were lost at this time and rough handling and rain also left their mark Whilst in E block further damage was sustained from damp as the block was bomb-blasted and tar from weatherproof

In February 1949 under Surgeon Rear Admiral Colborne a muster of books was carried out but no other evidence of this remains than a certificate to the effect that 15 books were missing from the Medical Mess This may imply that a branch establishment of current reference books from the main library was kept in the glass fronted cabinet in the Mess The total of books at that time was given as 2,467

Again in 1954 the Library was moved this time to the top floor of the Receiving



A title page fr om Galen



[illegible] n the above

Room block, but when this became due for a refit four years later the final transfer to its present site on the top floor of Trafalgar block took place under the directions of Surgeon Rear Admiral Beaton.

The books were now sorted, listed and arranged on shelves, the master at this time being 2 490 volumes, but unfortunately nothing further was done and no one apparently having any great interest in the matter, dust settled thickly down again until Surgeon Rear Admiral Mansel Reese directed the present undertaking.

Many very interesting books are to be found in this Library, some of them of considerable antiquity and rarity, other splendidly illustrated in colour, whilst at least one *Minutes of evidence on the pay, rank and position of Medical Officers in the Army and Navy* makes fascinating reading. Two extracts will suffice. They represent the replies of medical officer witnesses:

Q 858 I must keep a horse as I understand the Regulations.

860 You would not like to see a man on parade riding a Shetland Pony.

Para 5, page 11. Naval Medical Officers in addition to their full pay are allowed servants or 1/- *a day for each*.

The most venerable volumes printed in Latin are *Medicæ Artes Principes* in two volumes, dated 1567, and *Galeni Opera*, a complete set of four volumes and index dated 1586.

The full list of titles, both Medical and Lay, makes absorbing reading, but even a few selected at random show that many of our present-day problems are by no means new. As examples I quote *Gunshot Wounds* 1827 and *Surgery of the Wars* 1845. *Diseases feigned and fictitious* 1843 and *Influence of Railway Travel* published by the *Lancet* in 1862.

At the turn of the 19th Century the Water Cure was in high vogue and many books were written on the subject. There is an 82-page illustrated volume in this Library entitled *The Portable Sudatory*, which must have been mandatory reading.

Some 40 years later medical men became greatly concerned with famine, flora and climatic conditions in various parts of the world, from Devon to The English parts of Spain (shades of Franco)—Sierra Leone to the Zambesi and beyond. A gentleman named Hawkins carried this a stage further with a book simply entitled *Sea Dragons* in 1840. The voyage of H.M.S. *Sulphur* and *Beagle* are fully covered with illustrated and charted narrative, and the medical histories of the American Rebellion and of the Russo-Japanese War are full of interest and show a surprising rate of recovery from the most desperate of wounds.

It is now proposed to make the fullest use of the Library as a modern working Reference Library with specialized Journals as well as the more ordinary medical publications and textbooks, within the ever-present financial limitations.

No doubt the more dilettante bookworms will also find, out of working hours, of course, much palatable and easily digested matter from the leaves of the past.

Acknowledgment

I wish to thank Surgeon Rear Admiral J. Mansel Reese, C.B., O.B.E., Q.H.P., for permission to publish this article.

A BATH IN A DARING CLASS DESTROYER

By Surgeon Lieutenant-Commander J. A. CAMERON, R.N.

WHATEVER you do undress first in your lovely cabin. Shedding clothes once you've reached the bathroom is hardly feasible for anyone other than a matchstick man. As you discard your garments lean past your cabin mate (with apologies if you like him) and fold your clothes nicely on the back of your chair—just beyond his ear lobe. Wriggle your towel around your hips and ease yourself over to the wash basin to collect your tackle. His slippers and your shoes will probably never be the same again: you've trodden the heels flat in your attempt to avoid placing a foot in the waste basket. Whilst reaching high for soap above the washing cabinet your hand inadvertently rests on a tap. It swooshes for a half minute as you wrestle for your soap and the catchline cans beneath the basin overflow on to the cabin floor. With a grunt of annoyance and avoiding the pained eye of your companion you make hastily over the centimetre or so to the door. Out, round and up. As your slipper sole goes below the top rung of the ladder and your foot and the slipper welt above . . . you remember the scrubbing brush behind your bunk—better have it. Send yourself back past the flailing arms of your friend who smiles thinly at you headless through the second buttonhole gap of the shirt he's donning. Your friendship is further confirmed as you retrace your steps scoliotically bent over the squelchy carpet with your nail brush. Up the hatch with a final wiggle through the narrow chimney remembering not to envy the sailor nearby who emerges easily from the whole mouth entry to his Mess. You remember you have need of the heads before your bath. In turn close and lock carefully now: your hands are full and there is that slight roll on the ship. Where can you put your soap and brush, towel and things? You can't really so give up the idea until you've deposited them in the bathroom. Turn around again carefully making sure your knees and chest are hard pressed against the door open and out. Alice in Wonderland had a hand in the bathroom design—it's shaped like a question mark, as also may be the hot tap, as who knows what's within it? Hot water or cold to mix with the black smuts which emerge? Yes, it's very hot tonight, but turn it off quickly because the cold needs ten minutes notice with the tap on before water arrives. During this time meditatively revisit the heads.

You re-enter the bathroom to the accompaniment of the happy splash from the cold tap: start the hot and soon a pleasant steaming bath is before your eyes. Manœuvre round so that your rearmost parts point into the narrow shaft of the question mark. This is so as to enable you to leave your slippers the right way round for yourself when you leave the bath: a foot on the floor and you know you will reawaken the tinea in your toes so laboriously killed with the last of the ship's Tinaflax. Step in and enjoy it . . . never mind that your fellow officers barge in whilst you assume that undignified pose you use when washing your hair: mustn't be self

conscious and anyway your turn will come tomorrow Condensation is dripping coldly on your back now so hurry up and get out The roof permits a pygmy to stand like a guardsman, so remember to crouch judo fashion as you dry vigorously across your back until a twist of towel catches in the dead light wrenches from your hand and flutters downwards ghissading over your loins and into the water It doesn t always happen

Slippers on wash out the bath to avoid that mental note your cabin mate has that the daily coal grime tide mark is you and return to your cabin Your warm back touches the cold steel of the chimney as you make your way but you are not concerned because that slipper welt is causing trouble again

The cabin is empty so with gay abandon you shoot arms into your dinner shirt and stride into your trousers across the cabin Tie adjusted single end abashedly tucked away bell-boy suit finally brushed and you emerge and re-emerge upwards on to a wintry upper deck Having eluded the coils of rope and not shithered to your knees on the remains of those split bagged potatoes loaded today you arrive almost at the wardroom flat On this ladder remember that on the fifth step up you must lunge pelvically forward to avoid that crack across your sacrum The warm glow of the wardroom lights the gentleman's existence within the amiable Chinese stewards all beckon onwards

You find that all have sat down and, as you are the last you buy everyone a nice glass or two of red wine Remember you are a doctor and overpaid anyway as you realize another bottle will be needed unless you are to have the dregs of the first but you love the life and you did volunteer

EFFICACY AND FREEDOM FROM SIDE EFFECTS OF SLOW-RELEASE FERROUS SULPHATE ("FEOSPAN SPANSULES")

By Doctors M. L. J. SEGALL, L. P. SAYERS, L. R. SWEETMAN, and R. C. TYNER

In the treatment of iron deficiency anaemias the logical choice of the physician is a preparation acceptable to the patient which will produce as few side effects as possible and which will achieve optimal haemoglobin formation. Most physicians will probably agree that there is little to choose between the various preparations in current use as regards clinical efficacy, though the dosage requirements vary from one to the other. On the question of side effects there is rather less unanimity of opinion, however. Kerr and Davidson (1958) considered that gastro-intestinal intolerance was "largely psychological" and Hayhoe (1961), summarizing the work of various authors, states that higher rates of intolerance were associated generally with high dosage levels. It seems clear that both factors are important and a preparation that can be taken less frequently and permits lower daily dosage would therefore be advantageous.

Pregnant women are especially liable to show a high incidence of gastro-intestinal side effects when given iron preparations. Kramer (1962), however, showed that a sustained release preparation of exsiccated ferrous sulphate (Feospan Spansule capsules) was both efficacious and devoid of side effects in his series of such patients. These capsules contain 150 mg. of ferrous sulphate in the form of slow-release granules. The granules release the ferrous sulphate at various rates so that prolonged action is obtained following on an immediate initial effect. It seems possible, having regard to the current "mucosal block" theory of iron absorption (Goodman and Gilman, 1956), that the efficacy of smaller doses of ferrous sulphate given by this method may be due to availability of iron for absorption as soon as the ferritin saturation of the cells of the intestinal mucosa falls.

Material and Method

This paper reports a trial of Feospan Spansule capsules in the treatment of 65 unselected anaemic patients encountered in four general medical practices. There were 49 women and 16 men and their ages ranged from 16 to 87 years (mean 44). They were all suffering from iron deficiency anaemia due to a variety of causes and all were treated with two Spansule capsules daily. Haemoglobin estimations were carried out at the commencement of treatment and at weekly or fortnightly intervals thereafter until further rises in haemoglobin ceased, satisfactory levels having been obtained.

Practice (Initials)	No of Patients	Mean Pre treatment Hæmoglobin %	Mean Daily Hb Rise	Mean Total Rise	Mean Length of Treatment (days)	Side Effects
M L J S	16	61	0 41	11 3	27	Nil
R C T	17	71	0 23	12 1	53	Nil
L P S	21	57	0 62	20 6	33	Nil
I R S	11	65	0 44	19 3	44	1—nausea 1—vomiting 1—abd pain and const
Total	65					
Grand means		63	0 41	16	39	

Results

The results of treatment are given in the table above It will be seen that the mean daily hæmoglobin rises obtained ranged from 0 23 per cent to 0 62 per cent per day (grand mean 0 41 per cent) The mean duration of treatment ranged from 27 to 53 days (grand mean 39 days) The mean hæmoglobin at commencement of treatment ranged from 57 per cent to 71 per cent averaging 63 per cent

Side Effects

None of the patients of the 54 treated in three of the practices complained of side effects Of the remaining 11 patients treated by one of us (I. R S) there were three complainers of side effects A young woman of 20 complained of some griping and constipation at the commencement of treatment only and another aged 22 complained of some nausea A man aged 30 experienced vomiting at the commencement of treatment but as his anæmia was associated with ankylostomiasis some doubt was felt as to the precise ætiology of the symptom None of these three patients found it necessary to discontinue the medication and in all the symptoms were transitory or mild

Discussion

The rate of formation of hæmoglobin varies with the severity of the anæmia Whilst a maximal rise for a patient with a hæmoglobin of 50 per cent or less would be around 1 per cent per day, for a patient whose initial hæmoglobin was 65 per cent

the optimum response would be around 0 5 per cent per day (Goodman and Gilman 1956) It will be seen that in three of our four practices our figures correspond roughly with these criteria In the remaining practice (R C T) the average rise of 0 23 per cent per day appeared a little low Analysis of the figures for this practice showed that of the 17 patients concerned seven (six women and one man) showed a mean daily haemoglobin rise of only 0 16 per cent while that of the remaining ten was 0 34 per cent

The case histories of these seven patients were examined and it was found that the man was a chronic alcoholic who it was felt might have failed to take treatment regularly Of the six women two were menopausal and inclined to suffer from menorrhagia and one other had been treated previously with various other iron preparations with no better response There was no obvious explanation for the below average response of the other three women

In the remaining three practices there were three other patients whose rates of haemoglobin regeneration were lower than would reasonably be expected from their initial haemoglobin values Two of these patients were suffering from chronic haemorrhage (one from menorrhagia and the other from chronic gastro intestinal bleeding) The third patient was pregnant and no obvious cause was found in her case

Conclusion and Summary

Sixty five unselected patients drawn from four general medical practices and suffering from iron deficiency anaemia were treated with two Feospan Spansule capsules daily for mean periods ranging from 27 to 53 days (mean 39 days) The rates of haemoglobin regeneration of 55 of the patients corresponded reasonably well to those expected from their initial haemoglobin values Ten patients did not obtain as rapid haemoglobin regeneration as might have been expected four of these were suffering from chronic or recurrent haemorrhage one was a chronic alcoholic and the anaemia of one other had previously been found "refractory" to previous oral iron therapy There was no obvious clinical reason for the under average results of the remaining four

Only three patients complained of symptoms which might reasonably have been regarded as side effects

It is concluded that this treatment is acceptable to the patients reasonably devoid of unpleasant side effects and clinically efficacious in a high proportion of patients

ACKNOWLEDGMENT

We wish to thank Smith Kline and French Laboratories Ltd for the supply of the Feospan Spansule capsules used in this investigation

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THE USE OF "ESKORNADE" FOR ROYAL NAVAL AIRCREW UNDERGOING HIGH ALTITUDE TRAINING

By Surgeon Lieutenant-Commander J. MURRAY YOUNG, R.N.

Due to the change in atmospheric pressure experienced with change in altitude it is essential that all aircrew should have patent Eustachian tubes capable of easily and quickly equalizing pressure between the middle ear and the ambient atmosphere. Before starting their flying training all Royal Naval personnel are examined by the Central Air Medical Board and all those with gross oro-nasal or sinus abnormalities or histories are excluded.

The aircrew then attend the Royal Naval Air Medical School for a course on oxygen and high altitude physiology. During the course they undergo three runs in the decompression chamber at a simulated altitude of 37,000 feet and a run at 27,000 feet during which they experience the effects of anoxia. Aircrew thereafter do this course at four yearly intervals.

The inexperienced aircrew fairly frequently have difficulty in clearing their ears until they have learnt the knack and any degree of swelling of the mucosa of the Eustachian tube, due either to infection or barotrauma, increases this difficulty.

As this course is closely phased into the flying training programme of the inexperienced aircrew and removes the experienced people from their squadron duties we are always unwilling to keep aircrew longer than is essential to complete the course. Therefore at the Air Medical School we allow the use of decongestants of all kinds to enable aircrew to clear their ears and so complete their high-altitude-chamber work although these substances are all forbidden for use when on flying duties because of the side effects.

Material

Following trials carried out on Diving and Submarine Personnel (May, May and Hollyhock) the R.N. Air Medical School has carried out a trial using "Eskornade" spansules an oral decongestant. These contain:

Phenylpropanolamine hydrochloride "Propadrine" (a vasoconstrictor)	50 mg.
Diphenylpyraline "Histryl" (an antihistamine)	5·0 mg.
Isopropamide iodide "Tyrimide" (an anticholinergic)	2·5 mg.

Dosage is normally 1 spansule b.d.

Selection of Patients

Sixty-eight personnel have been treated with "Eskornade," their average age being 22 years. Of these 28 were normal personnel who were given 1 spansule b.d. to determine the frequency and type of side effect which might be expected at this dosage.

There were 40 patients who were treated for the following symptoms:

Coryza early acute (rhinitis without rhinorrhœa)	14 cases
Coryza terminal stages (with rhinorrhœa)	15 cases

[illegible]	[illegible]
Sinusitis	1 case
Sinus barotrauma	2 cases
Otitic barotrauma	3 cases

Results

Of the 14 patients with early acute coryza two were unable to clear their ears and so could not complete their high-altitude work. Nine patients had an excellent result with "Eskornade" and had no trouble with clearing their ears. The remaining three patients had slight trouble on one or more of their high altitude runs but were able to complete their training.

The 15 patients treated in the later stages of coryza were able to clear their ears without difficulty and completed their training.

The six patients with catarrh all completed their training. One required local application of decongestants to overcome slight difficulty in clearing his ears. Another stopped taking the spansules on Sunday, had no trouble on Monday but difficulty on Wednesday so started taking the spansules again. he completed his training on the Friday without trouble.

The patient with sinusitis successfully completed his training after treatment.

One patient with sinus barotrauma developed sinus pain on all attempts to reach altitude. This was found to be due to previously symptomless partial stenosis of the fronto-nasal duct and was operatively treated by dilatation. three months later he successfully completed his training.

The other patient with sinus barotrauma developed symptoms on Monday so was started on 1 spansule t.d.s. He misunderstood his instructions and so took only two spansules on Tuesday and then stopped. He had no trouble on Wednesday during the high altitude run. but developed symptoms again on the Friday.

Of the two patients with otitic barotrauma one had only mild inflammation of the tympanic membrane and having been put on "Eskornade" as a precaution completed his training without difficulty. The second patient had a generalized inflammation of both membranes with a slight transudation into one middle ear cavity. After two days on "Eskornade" he was able to clear his ears only with great difficulty and then went on a week's treatment with locally applied decongestants before being able to complete his training.

In all of the 40 patients treated with "Eskornade" using the criterion of whether or not they could clear their ears 32 had a good result four had a fair result and four had a poor result.

Side Effects

The side effects complained of during treatment were:

Dryness of mouth or throat	9 cases
Tired	19 cases
Very tired	7 cases

The significance of these side effects is mitigated by several factors.

(a) No placebo spansules were available so that the psychological effect cannot be discounted.

(b) Breathing 100 per cent. oxygen tends to produce a dry mouth.
(c) It has been frequently noted that high altitude training has itself a tiring effect, especially in inexperienced aircrew.

However seven patients had to discontinue treatment with Eskornade because of tiredness. Of these one patient took only two capsules the first in the evening and the second the following morning about 0900 after the second dose he fell asleep over his desk.

Discussion

The only method of obtaining controls for this trial is by comparison with the figures for the preceding years.

In 1959 304 aircrew underwent their high altitude training at the R.N. Air Medical School. Of these 13 (4·3 per cent.) were unable to complete their training because of sinus barotrauma or of difficulty in clearing their ears due either to an upper respiratory tract infection or to otitic barotrauma. Five of these 13 had done from 79 to 2 930 hours flying and the other eight had no previous altitude experience.

In 1960 277 aircrew received their altitude training and 15 (5·4 per cent.) were unable to complete the course. 13 because of an upper respiratory tract infection and two because of sinus pain. Seven of the aircrew had done between 772 and 2 220 hours flying and eight had no previous experience.

During the period of the trial 169 aircrew received their training and four (2·4 per cent.) have been unable to complete the course. two because of upper respiratory tract infections. one because of sinusitis and one because of otitic barotrauma. Only one of these four had any previous high altitude experience.

The numbers involved in the trial are too small to give a statistically significant difference between "Eskornade" and locally applied decongestants. However during the trial the incidence of aircrew being unable to complete their high altitude training is less than the average incidence over the previous two years. Of the cases treated 90 per cent. obtained sufficient decongestant action to complete their training.

Conclusion

The incidence of side effects precludes the use of Eskornade in aircrew actively engaged on flying duties but this trial has shown that Eskornade produces relief of the symptoms of upper respiratory tract congestion to a degree at least equal to that of locally applied decongestants.

Summary

Sixty eight personnel undergoing high altitude training were treated with Eskornade an oral nasal decongestant. Twenty-eight of these personnel were treated to determine the possible side effects of the drug. Of the remaining 40 patients with initial symptoms of upper respiratory tract infection or barotrauma 36 were able to complete their high altitude training in the normal time.

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THE USE OF THE OPERATION OF MEDIAL RECTUS RECESSION IN A SERIES OF 50 CHILDREN WITH CONVERGENT STRABISMUS REQUIRING SURGICAL CORRECTION

By Surgeon Commander P D A DURHAM, R N

The commonest operation employed for the surgical correction of convergent strabismus is that of the recession of the medial rectus muscle Basically it is a simple procedure involving the severance of the muscle from its insertion and refixing it with anchoring sutures further back There has been a tendency to complicate a simple operation by an over-elaboration of technique Once a patient is alternating or has attained his best possible visual acuity and a manifest angle is present the decision to operate should be taken To delay on the grounds of age is either to put too big a stress on the technical difficulties or to fail to see that the development of binocular fusion must be actively hindered if a manifest angle is present

In the series under review 50 children from the age of 20 months to 11 years are considered They were mainly the children of U K personnel serving in Malta and came from varied social and financial grades Because of the relatively few numbers it was possible to explain to the parents the rationale of the proposed treatment at their first visit in some detail and to remove some of the popular misconceptions about occlusion and the indications for operation Once the decision to operate had been made the child was admitted to the children's ward on the morning of the day before operation This enabled the patient to get to know the other children in the ward and also the ward staff No local preoperative preparation of the eyes and its surroundings is considered necessary The practice of cutting the eyelashes as close to the lids as possible is considered not only unnecessary but undesirable in so far as it always results in local soreness leading to rubbing of the area in the post operative period effectively negativing any alleged gain from reduced risk of local contamination Endotracheal anaesthesia is employed and no limitation whatsoever on the choice of anaesthetic by the anaesthetist is made because the use of a hot point has been found unnecessary if anchoring haemostatic sutures are used Positioning of the patient was important and the table was lowered towards the foot end to reduce any possible congestive effects by hypotensive hypostatic effect of this manœuvre

Cleansing of the operative area was done by simple washing of the external skin by a hexachlorophene soap The insertion of a black silk traction suture into the lateral conjunctiva has been discontinued on the grounds that it only introduces two extra possible portals of entry for infection without commensurate gain in exposure Some speculæ have a tendency to produce local lid trauma and the most suitable found was a small Clark's speculum although it was open to the objection that it

did not always keep the eyelashes entirely away from the field of operation The initial conjunctival incision is made with a pair of curved on flat scissors The advantages of this type over the more conventional straight ended scissors in a meridional incision should become apparent from the diagram



(a) *Using curved on flat scissors* (b) *Using straight blunt ended scissors*

Complete isolation of the anterior one-third of the medical rectus muscle is needed and this requires careful division of any attachments or expansions of Tenon's capsule The division of the muscle at its insertion can be simply and effectively carried out using only a pair of blunt ended scissors Ordinary surgical competence allows the excision to be sufficiently close so as not to leave a cuff of tissue which the purists might argue was negativing the result of the recession by performing what is in effect a small resection Over-emphasis of this aspect by shaving off the insertion too close may make the subsequent fixation of the globe for the anchoring sutures unnecessarily difficult It is also possible to postulate that excision of the entire insertion will inevitably include a proportion of fibrous tissue whose part in the subsequent reinsertion of the muscle to the sclera is a matter of conjecture

The choice of suture for reattaching the severed muscle to the sclera is of importance In the present series a combined haemostatic and anchoring suture has been employed It has the important advantage of ligating the superior and inferior vascular bundles of the medial rectus muscle and thus securing haemostasis and also of being economical in time and suture material The ligature of the bundle is first effected, leaving both ends long with the atraumatic needle *in situ* and this is then used for insertion of the anchoring suture of the reattachment It is important to stress that a reef knot should be made for the initial haemostatic portion as if only a single hitch is used the impression was gained that some subconjunctival haemorrhage was noted

Diagrammatically this can be expressed thus



Case No.	Orbital film	Sex	Age	Age of onset	Days in hospital	Corrected vision	Glasses	Alternation	Perspective angle	Perspective-free angle	Comment
1	Yes	M	6	3 l	5	6/5 6/9	3 50 3 50	Yes	R 18 L 15	R 15 L 10	L.C.C.S. ? Birth trauma. High forceps
2	Yes	F	4	2 yrs	5	6/12 6/60	7 50 2 25 6 50 90	No	25 25	10 5	L.C.C.S. Left amblyopia screen for fixation. Bilateral recession.
3	Yes	M	6	4 yrs.	5	6/6 6/6	3 50 6 50	Yes	25 20	6 3	R.C.C.S. Bilateral recession
4		F	3	6/12	5	6/18 6/18	1 00 ax 180 7 00 ax 70	Yes	20 10 Subjective y 20	20 20	L.C.C.S. Essential alternator. Postoperative divergence. Bilateral recession.
5	Yes	F	4	7/12	5	6/9 6/9	4 50 5 00	Yes	30 15	17 2	L.C.C.S.
6	No	M	1	1	6	Too young	7 50 2 50 6 50 30	Yes	30 19	1 5	L.C.C.S. First stage R.M.M.R.
7	Yes	F	3	18/12	5	6/5 2/60	4 00 4 50	No	72 10	10 3	Head pte. cons. op. 9/56. Amblyopic left eye
8	Yes	F	5		4	6/12 6/9	1 00 00	Yes	15 15	8 5	
9	Yes	F		9/12	4	Too young	7 5 3 5	Yes	9 15	NK UK	
10	Yes	F			4	Too young	Notic	Y		10	First stage R.M.M.R.
11	Yes	M	2	8	5	Too young	4 00 4 00	Yes	31 5	5 10	R.C.C.S. First stage L.M.M.R. Head deviation from bd retractor
12	Yes	F	3	6/12	4	Too young	1 75 1 00 1 50 125	Yes	11 1	3 1	
13	No	M	9		5	6/6 6/36	2 00 2 50	No	75 L R	11 5	Previous op. ral on elsewhere. Left on My put Esotropia Fan on
14		M	5	1	4	6/9 6/6	No glasses	Yes	Esotropia Rt Hypertropia Lt	NK UK	
15		Yes	M	4		1	6/6 6/6	1 00 00 0 50 0 50 90 30	No	74	Previous alternator
16	No	F	1	1	1	Too young	4 50 4 50	Y	20 0	Report not available	
17	Yes	F		7/12	5	Too young	7 00 50 0 50 40	Yes	Variable up to 35 35	8 5	

Case No.	Orthoptist	Sex	Age	Age of onset	Days in hospital	Vision at first	Vision at last	Abduction	Convergence angle	Prism vergence	Comment
8	Yes	M	7	17 12	3	Too young	5/60	5/60	Yes	35 15	15 5	
							0 50 90	11 50 90				
19	Yes	F	7	9 17	3	Too young	4/60	4/60	Yes	35 28	15 3	First stage R M R.R
							0 50 90	0 50 90				
9	Yes	F	55	4	4	6/9 6/9	5/25	5/25	Yes	Vari able up to 35	20 5	First stage—Heredofundus
	Yes	F	4	39 17	3	6/12 6/12	0 75	0 75	Yes	15 15	5	First stage
	Yes	M	1	7	4	Too young	3/60	3/60	Yes	30 15	10 3	
							0 75 90	0 75 90				
	Yes	M	2	1	5	Too young	3/60	3/60	Yes	30 20	7	Behaviour problem
4	Yes	M	3	28 12	3	Too young	2/36	2/36	Yes	35 25	15 10	
	Yes	F	3	8 17	4	Too young	3/25	3/36	Yes	20 10 15	10 5	
							0 50 90					
	N	F		15 12	4	Too young	1/60	1/60	Yes	Variable 10–15	10 4	Spastic child
	N	M	20	5 17	3	Too young	2/36	2/36	Yes	25 25	20 5	First stage
	Yes	M	3	Birth	5	Too young	5/60	6/60	Yes	17 18	25 3	Some height
	Yes	M	4	16 17	3	6/6 6/60	3/60	5/60	No	25	2 0	Accommodation
	No	M	47	4	3	6/9 6/6	4/36	4/25	Yes	35 15	3 3	
	Yes	M	7	3	4	6/24 6/6	1/36	1/25	No	50 25	10 0	Septal defect
							0 25 90	0 25 90				
	Yes	M	7	4	5	6/6 6/6	2/60	1/60	Yes	30R L 20R L	12 5	Previous operation elsewhere
							1 75 10.3	11 25 90				
	No	M	1	3 17	3	Too young	7/60	7/60	Yes	30 25	15 5	
4	Yes	M	4	79 1	3	6/9 6/9	7/25	7/25	Yes	12 3	0 7	
	Yes	F	4	31	3	6/6 6/6	3/60	3/60	Yes	30 15	8 0	R 3 75 L 5 00
	No	M	9	16 1	3	6/6 H M	Name myopia		No	20	1	N.P. Patient Enuretic
	No	F		55 17	3	Too young	7/60	7/60	Yes	30 35	20 15	
6	Yes	M	3	Birth	5	6/9 6/18	4/25	5/25	Yes	50 70	10 5	
							0 75 90	11 25 90				

Case No.	Operation	Sex	Age	Age at exam	Days in hospital	Corrected VA in	Glasses		Alternation	Preoperative angle		Postoperative angle		Comment
39	Yes	M	8	2½	3	6/6 6/24	1 50	1 50	No	15	12		0	Treated elsewhere
40	Yes	F	1	4 17	3	Too young	3 50	4 00	No	10	25	5	0	Treated elsewhere. Esotropia left final on
41	Yes	F	7	N K	3	6/6 6/6	0 50 0 75 30	0 50 0 75 90	Yes	10	5		10	Multiple ol ld
43	Yes	F	6	1	3	6/9 6/9	1 50	3 50	Yes	35	30	70	10	Treated elsewhere.
43	Yes	F	4		3	6/9 6/12	5 75	5 75	Yes	30	7	5	0	
46	Yes	M	3	N K	3	Too young	1 00 3 75 90	2 25 1 50 90	Yes	20	10	5	5	
45	Yes	M	3	3	4	6/6 6/6	4 00	4 00	Yes	25	10	0	0	
47	No	F	11	7½	3	6/6 6/6	5 50 1 50 110	5 00 0 75 75	Yes	10	35 0 10	Variable 30 at will but		
47	No	M	7	7	3	6/9 6/12	3 5	3 [illegible]	Yes	30	23		5	
48	Yes	F	7	6	3	Too young	1 75	2 75 75 180	No	25	3	0	5	Esotropia left final on
49	Yes	F	6	3	3	6/9 6/60	3 75	4 75	No	20	5	0	5	Esotropia fixation Left amblyopia
50	Yes	F	3	2½	4	Too young	1 00 Accomod ative	1 00 Agree Objective	Yes	30	25	15	10	
		M	7	1	5	Too young	2 50	3 50 0 50 90	Yes	20	5		5	
0		F	2		3	Too young	None		Yes	15		0		
1		M		11	3	Too young	4 00	4 00	Yes	10	5	0	0	
3		F		7 1	5	Too young	4 00 0 50 90	4 00 0 50 90		20	1	5	15	
		F	6	4	1	6/1 1 1	6 00	6 00		1	5	N K		
1		F	5	39 2	3	1 6 6 6	75	0 75		30	20			No fu ow
27		M		18 1	4	Too young	3 5	3 25		30	20	0	0	

The closure of the conjunctival wound should have been simplified by the use of curved on flat blunt ended scissors leaving a regular curved incision The mid points of the distal and proximal edges should be held with a black silk traction suture and by holding the ends of the incision with fine forceps it is possible to hold the wound edges away from Tenon's capsule and automatic apposition occurs rendering the insertion of single-hitch tightly tied interrupted sutures a matter of ease If this precaution is used it should be impossible to get a postoperative granuloma that occurs when Tenon's capsule is inadvertently included It also has the advantage that no removal of sutures is necessary as they cut out spontaneously within a few days

Postoperative Care

The most important single item is that no padding or dressing whatsoever is employed on a single muscle operation As soon as the child is reasonably well recovered from the anaesthetic and conscious the spectacles are put on One of the postoperative complications noted is that patients who have had squint operations seem to have a higher incidence of postanaesthetic vomiting Hot spoon bathing and Guttae Hibitane 1 4000 are given thrice daily and Elixir Phenergan in requisite doses as a mild sedative Reading is forbidden as are small toys but large ones are encouraged The child is allowed up on the day after operation and, in the absence of any untoward complication is discharged the day after The parents are instructed to continue the hot bathing for a further 48 hours and are warned of the presence of the sutures in the conjunctiva

Summary

The use of a simple regimen involving the operation of medial rectus recession in 1 consecutive series of 50 children is described The average stay in hospital was under four days and this has been achieved without using any antibiotics whatsoever apart from Guttae Penicillin which was at first used at operation to keep the cornea moist but even this has been supplanted by Guttae Hibitane The practice of cutting the eyelashes has been discontinued in favour of wearing spectacles as soon as possible after the operation and padding is no longer considered necessary

It is suggested that this short stay in hospital is of considerable benefit to the child from the mental aspect and that this has been achieved without any increased risk of complication or loss of efficiency of operative results A detailed analysis of the findings is attached as an appendix

ACKNOWLEDGMENTS

The permission of Surgeon Rear Admiral W V Beach OBE QHS FRCS (Edin) the Medical Officer in Charge of the Royal Naval Hospital Malta to publish this paper is gratefully acknowledged

I would like to thank the Orthoptists at the Royal Naval Hospital for their very considerable help and also Mr Frank Heckford the Consultant Ophthalmic Surgeon to the Isle of Wight Group Hospital Board without whose initial guidance this paper would never have been written

TWO HUNDRED CASES OF VENEREAL DISEASE

Some observations and comments on 15 months in the Far East

By Surgeon Lieutenant D S WRIGHT R.N

MANY of the medical officers on the Far East Station are at an early stage in their Naval careers and will come up against the problem of venereal disease with limited previous experience and often with limited facilities and assistance available to them I was in just such a state and it is felt that this account may be of some interest and benefit

It should be explained at the outset that this is in no sense a scientific survey There were very limited laboratory facilities available for much of the time and diagnosis was rarely confirmed by culture My experience of venereal disease when I reached the Far East was almost nil and undoubtedly I made errors in diagnosis and in treatment

Incidence

The cases under review were all those in one ship in the 15 months period During this time there was an average population at risk of 230 but this was not static as through drafting illness and other causes there were many changes of personnel The group can be divided into European ratings, Asian ratings and officers There was an average of 13 officers during the time but 20 individuals made up this number Similarly all the official Chinese ratings except one changed completely There were no cases of V D in either of these two groups

There was an average of 205 European ratings but there was a total of *about* 250 who came at risk at one time or another during the period under review Of these 105 patients shared 200 cases of V D between them

Number of patients with 1 attack	= 48	— 48 cases
Number of patients with 2 attacks	= 31	— 62 cases
Number of patients with 3 attacks	17	— 51 cases
Number of patients with 4 attacks	7	— 28 cases
Number of patients with 5 attacks	= 1	— 5 cases
Number of patients with 6 attacks	1	6 cases
Total number of patients	— 105	
Total number of cases	200	

Incidence related to Time and Place

Although it is true that venereal diseases are more prevalent in certain places than others they are undoubtedly to be found in almost every seaport in the world and no evidence as to prevalence can be deduced from my figures Of far more im

[illegible] instances in which a ship [illegible] port such as the length of the time since the last visit the novelty of a port the amount of stress before such a visit the place last visited and the proximity of pay day

The 15 months can be divided very roughly into phases

Phase 1 A six week period travelling to the Far East

Phase 2 A five-month period involving initial contact with the Station a prolonged period at sea under trying conditions with the possibility of active service a short break in Mombasa and eventual return to the Far East

Phase 3 The remaining time under peacetime conditions on the Far East Station

During Phase 1 we called at Gibraltar Malta Aden and Colombo for a total of 13 days harbour time Two cases of gonorrhoea were acquired in the same brothel in Colombo and these were the only two cases of V D during the time

During Phase 2 we started with a period of 25 days in or near Singapore 21 days being alongside This was for most the first taste of the Far East and in spite of lectures by myself and the provost marshal we acquired 23 cases in the time

There followed a period of four and a half weeks at sea mainly in the Persian Gulf This was in mid summer with little air conditioning in a state of constant readiness for possible action There was little relaxation or recreation and it was most uncomfortable so that the 13 days spent cooling off in Mombasa were most welcome, but I had another 33 patients on the list After a further two weeks in the Gulf we returned to Singapore and in 23 days there were another 12 cases before we went to Hong Kong for the first time where we spent 18 days which caused another 26 patients to be at my door Thus in the first six and a half months after leaving U K we had spent 75 days in harbour and I had treated 94 cases of V D

In the next eight and a half months 159 days were spent in harbour and there were 106 cases These were spread out except for two upsurges one shortly after it was confirmed that the commission was to last longer than had been hoped and the other during a brief visit to South Japan It is noticeable that, whereas there was a steady flow of cases from Hong Kong from Singapore there have been few since the occasions mentioned a month in December producing nine cases and to the time I left there had been two cases in a possible 37 days though others may have manifest themselves since This recent reduction can probably be accounted for by the recommissioning date—mid-October

It would account for the difference in incidence in Hong Kong and Singapore by the different set up in the two places In Hong Kong the girls are usually contacted socially in bars where the atmosphere is pleasant and congenial These bars are situated only a short distance from the Naval Base In Singapore the city is a long way from the base and the girls are usually contacted only in their sordid places of work taxi and tri shaw drivers acting as pimps usually operating from outside the clubs in which the early part of the evening is spent by many ratings

Incidence in relation to alcohol

I have not made an accurate record of this but it is undoubtedly true to say that a very high percentage of V D is contracted by sailors while under the influence of alcohol

[illegible] related to [illegible]

On the V.D. card F.Med.15 both [illegible] is taken only in whole years. In [illegible] taken (in whole years) at which the patient first [illegible] sum and for estimating the average age of those [illegible] 1st August, 1962, of all those European ratings on board [illegible] wan's list and the average age on 1st December, 1961, calculated. This was taken as the mean for the period.

These figures gave averages of 23·6 years for those at risk and 23·5 for the patients. The difference is insignificant. However, of those who had more than one infection the average age was only 21·0, which seems to indicate that a little wisdom is required with age.

Influence related to Marital Status

I have records of the marital status of 95 of the patients: 35 (36·8 per cent.) married and 60 (63·2 per cent.) single. Of the 205 ratings on board 32·7 per cent. were married, so there is no indication that a married man is less likely to expose himself to the risk of V.D., and if anything, the reverse appears to be true.

The Diseases

Of the 200 cases, 15 were diagnosed and treated other than by myself, and these have not been included in the statistics of diagnoses, treatments or incubation periods.

Of the remainder, 63 were diagnosed as gonorrhœa, 103 as non-gonococcal urethritis, 18 as a mixture of the two, and one as a case of venereal warts (Condylomata acuminata).

Diagnosis was made solely from urethral smears taken first thing in the morning with a loop without washing the glans penis. Two other slides were examined under dark ground illumination for possible spirochetes, but none were found, and W.R. and Kahn tests were all negative throughout the time under review.

Gonorrhœa

Symptoms and Incubation Period

The onset of symptoms is usually accepted as from three to ten days after contact and the first symptoms as a discharge or mild dysuria. In my series these symptoms were seen initially and the discharge usually came first. The dates of onset of symptoms and of exposure to infection were taken routinely. The latter was frequently difficult to determine accurately as some ratings admitted to intercourse with a number of women over a short period preceding the onset of symptoms. Where this was the case an average of the incubation time was assessed at the time of treatment, each case being taken on its own merits.

Symptoms were first noticed on the third to the thirteenth day, though in only six cases after the twelfth day. The one case which appeared 30 days after exposure could not have been contracted later as we were at sea. The average incubation period of the 63 cases was 5·8 days.

Treatment

Initially all cases received 300 000 units of procaine penicillin in oily suspension as a single dose Cases were reviewed in three days and, if the patient reported no discharge and urine was clear of threads no further treatment was given and the patient was seen again in seven days time before being declared cured If there was slight but less discharge a further dose of 300 000 units of procaine penicillin was given and the patient seen again in three days If at this or at the first review there was no improvement a five day course of terramycin or tetracyn was given Only two cases responded to penicillin given in this way above and this form of treatment was discontinued early on and on reflection I find that the average duration of treatment early in the commission was longer than towards the end having increased the penicillin dosage firstly to two doses of 300 000 units of procaine penicillin on successive days and 1 MU of crystalline penicillin on the first day This latter dosage is similar to that recommended by the World Health Organisation in their Chronicle Vol 15 No 8 August 1961 and was found to be quite successful Nineteen of the 24 cases receiving this treatment had no further attention while five had to follow it with a five day course of terramycin

On some cases in Mombasa I followed local advice and gave streptomycin 1 gram daily for three days This was not highly successful and in view of the risk of even small doses of this drug I think its use was unjustified

On some of the early cases I used chloromycetin as well and I find I gave in a short space of time a variety of antibiotic drugs and I have commented later on such treatment

The average total duration of all forms of active treatment in both complicated and uncomplicated cases was 16 6 days Six of the 63 cases were complicated (see below) and the average duration of treatment of the remaining cases was 11 days This did not necessarily include the time before the patient was declared cured and it was advisable on occasion to leave a case without treatment for some days before this could be stated. This time under treatment undoubtedly includes several days due to failure of patients to report at the correct time for final checks a continual problem

Non Gonococcal Urethritis

There were 103 cases in which no gonococci were identified on the smear In 81 of these there were mixed non gonococcal organisms on the initial smear and in 22 no organisms were seen on any smear Although it was not my practice to clean the urethral meatus with spirit before taking a smear it seems unlikely that the organisms seen in 81 cases were coincidental to the infection and I view with scepticism the statement that 95 per cent of non-gonococcal urethritis is abacterial (B M 775 (1) 1953) I cannot of course substantiate my view, but it seems probable and I feel sure that practically all these cases were venereal in origin Since however it makes no practical difference whatsoever and treatment is identical, I have placed all the cases in the same category of N G U (venereal) As such a diagnosis carries no social stigma I feel no harm can arise from so doing and from the patient s point of view he is interested only in curing his discharge, which he considers was contracted venereally

Symptoms and Incubation Period

The average incubation period for these cases was 13 days with a variation of from four to 37 days Symptoms were similar to those of gonorrhœa but the discharge was usually thin and colourless whereas that of the latter disease is more frequently thick and greenish in colour

Treatment

Most cases of N G U were treated with a five day course of tetracycline (500 mg. stat 250 mg six hourly) and reviewed after five days It was frequently found at review that there was slight dampness which was treated with Mist Pot Cit and fluids and occurred less commonly in circumcised patients There were a few cases requiring further antibiotic treatment with aureomycin and or chloromycetin but this again was more common early in the commission

The average duration of all forms of active treatment was 15 7 days As before there were some cases requiring an exceptional period of treatment and if these four be omitted the average duration of treatment of the remainder was 11 2 days

Mixed Infections

There were 18 cases in which both gonococci and other mixed organisms were on the first or succeeding smears Usually the gonococci alone were seen initially after an average incubation period of 9 1 days and they were treated with penicillin Further treatment as for N G U was always necessary Four of these cases required 40 or more days of treatment as a result of complications occurring, the average duration of treatment of all cases being 24 3 days and of the uncomplicated cases 15 5 days

Condylomata Acuminata

One case of venereal warts with no other disease was seen and successfully treated with three applications of 3 per cent podophyllin on successive days

Complications

Most cases of gonorrhœa and of N G U still respond quite rapidly to treatment with penicillin or tetracycline There are a number of minor and some more serious complications which I encountered with sometimes prolonged treatment considerably That most commonly seen is a persistent dampness hardly a discharge which worried the patient and initially the doctor also As already mentioned, it occurs more frequently in the uncircumcised and it sometimes requires treatment with local saline and with Mist Pot Cit and copious fluids by mouth though it recovers as often without treatment Treatment of this type has a psychological effect and is necessary for some patients while reassurance alone will suffice for others

The complicated cases mentioned earlier in this article were all due to balanitis There were 22 cases in all, eight responding rapidly to treatment with saline, while the remainder required treatment varying in length from 40 days to five months—two cases requiring the latter time This complication frequently starts as a herpes progenitalis with small vesicles becoming inflamed and often encrusted I usually used normal saline swabbing to treat this irritating and sometimes painful complication

in the initial stricture and pictures [illegible] the nearest G U specialist (these requested by the specialists) before [illegible] further treatment That recommended varied considerably Saline potassium permanganate gramicidin aureomycin hydrocortisone ointment and nystatin cream were used at different times and with varying success one case requiring admission to hospital with paraphimosis The persistence of this complication is almost certainly due to the heat and humidity and it is of interest that in 30 cases in another air conditioned ship I have seen only one mild case of balanitis which cleared in a few days with saline swabbing

Venereal warts were seen in three patients one already mentioned and the others combined with a urethritis They respond well to treatment with podophyllin

Two probably traumatic ulcers were seen and both cleared rapidly with treatment with saline

Restrictions of Patients with V D

Stoppage of rum and leave was routine with all cases Sailors apparently prefer their tot to their leave but stoppage of alcohol is strongly advised by those specialists consulted

On arrival in the Far East I found it common practice to stop leave for a month in all cases It was my practice to stop leave for 10 days or until all possibility of the spread of infection had gone—whichever was the longer in those patients contracting V D for the first time during the commission In order to protect the patient from the consequences of his lack of control I stopped the leave for a period of one month for those having subsequent attacks I considered this advisable preventive medicine especially in view of the number of cases of V D occurring in the ship but I am doubtful whether it did any good and have discontinued the practice in my present ship If however I was placed in a similar circumstances I think I should do the same again as repeated attacks must increase the likelihood of permanent damage particularly urethral stricture As can be seen one rating contracted V D six times This was in a period of 11 months for half of which he was under stoppage of leave An application for his discharge as unsuitable (Q R & A I article 0868) was rejected at the highest level in view of his age (19 in August 1961)

Recommendations

Any recommendations must aim primarily at preventing V D— which must in turn include an inquiry as to why these diseases are so prevalent

In the Far East Army and Air Force personnel are accompanied by their families but for many afloat this is not so The opportunities for normal social contacts are thus very limited much more so for ratings and I feel this complete absence of any family life is the basic cause for the prevalence of V D in the Navy

It is to be expected that normal healthy young men should seek female company For the most part Army and Air Force camps are a long way from Naval Bases particularly in Singapore but also in Hong Kong and few sailors have many friends in the other forces in these places and they naturally seek native company

In the Far East there is a considerable unemployment problem particularly for young women who turn to prostitution as a means of survival Prostitution is illegal

in rest prices and thus there is no official control which makes V D extremely common and impossible to eradicate at its source With an estimated 5 000 prostitutes in Singapore and probably a similar number in Hong Kong it is hardly surprising that so many sailors have V D

Alcohol plays an important part in the dissemination of these diseases In Singapore few sailors set out with the intention of visiting a brothel but in the absence of more healthy occupations tend to make for various clubs where they stay drinking until closing time when they fall easy prey to the taxi and tri shaw drivers acting as pimps In Hong Kong the girls are usually employed as bar girls and it is here that they pick up sailors Many it is true form a regular association with a particular sailor but it is doubtful if they remain faithful when he is on duty or away from Hong Kong, judging from the number of sailors who eventually appear in the sick bay What is being done in the face of such an uphill task? An attempt is being made to trace contacts by the use of elaborate *pro forma* and the formation of vice squads Though I was greatly impressed with the efforts of the combined Army and Naval Patrol in Singapore it is obviously not achieving a great deal and few sailors are able to give many details of the girl (or girls) concerned when questioned

In the ship concerned I gave several lectures and showed a film Lectures are essential for educational purposes and must be given to ensure that everyone knows the risks and how to avoid them and has a knowledge of the signs and symptoms It is well known that most cases are easily cured and however much one lectures the attitudes of "it won t happen to me" and "if it does it s bad luck" are only too obvious Naval pilots know they run a considerable risk in flying, but they like it enough to do it[1] The available films do not seem to put anyone off

The use of condoms and post-coital washing are definitely to be recommended and the issue on the station, of gossamer condoms is sensible but very few take these simple precautions when it comes to it and frequently explain their failure to do so by saying they had had too much to drink or else that condoms get in the way

What can be done in the future ? I feel this is mainly a social rather than a medical problem and that if the Naval authorities wish to cut the V D rate much more must be done to provide the Naval ratings with a decent social atmosphere Having families in Singapore would help tremendously but the cost would be enormous Perhaps more use could be made of the system of affiliation of ships and Army or R A F Units though the burden of this would obviously be placed very considerably on these Services Until these requirements for more normal social contacts are met the problem of V D will continue in its present fashion In the meantime I feel more use could be made of the vice squads and I think it would be both useful in tracing contacts and salutary for the individuals concerned if after "catching the boat up" they accompany the patrol on their rounds of the brothels I feel sure that few who have seen those in Singapore when sober and when the lights have been switched on would have any wish to make use of these places again

In the treatment of cases there is nothing new t can recommend Penicillin still has a definite place in treating gonorrhœa and the dosage of t 2 mega units of procaine penicillin on the first day and 6 mega units of PAM or benzathine penicillin on the second day as recommended by W H O in the Chronicle previously mentioned

seems sensible N G U usually responds to terramycin tetracycline preparations

In treating both these diseases a considerable amount of patience is required As has already been mentioned some post treatment dampness is very common and the urge to do something about it by both patient and medical adviser is strong but should be resisted Most of these will clear with no treatment though some may require saline Nothing more drastic should be exhibited for a good period following the initial treatment and skilful reassurance of the patient is required It is a perpetual bleat of G U specialists that they continually receive over treated patients and in my experience this is all too easy If cases of balanitis persist they should be referred to a specialist with the assistance of full laboratory facilities rather than showered with expensive potions lotions and pills

A constant vigil for syphilis and the other less common venereal diseases must be maintained and no relaxation in the regulations regarding routine blood testing should be permitted

The only training in V D received after coming into the Navy was a brief demonstration of the preparation of a microscope for D G I examination In view of the number of cases one is almost certain to see I feel a little more instruction of medical officers during their course at R N Hospital Haslar or while at R N B—Portsmouth would be of value

Lastly there remains a question recently posed to me Why do we all get steamed up about V D ? As was pointed out to me the treatment is comparatively simple and other diseases produced or worsened by man's indulgences and follies are accepted and we do what we can, and yet in some not clearly definable way we object to V D What grounds have we, then for growing hot under the collar and raising our hands in horror—and not doctors alone but executive and other officers also—when a man catches a dose"? It cannot, surely be the expense of treatment There is no waste of manpower Presumably there is within us some deep-rooted moral objection and as few of us can claim perfection perhaps we are wrong in this outlook and should reorientate our thinking Undoubtedly we as officers have an obligation to assist in the moral education of those under us but becoming upset over V D is tantamount to forgetting the ten commandments and accusing a rating of disobeying the eleventh—' Thou shalt not be found out

Summary

Two hundred cases of venereal disease seen in a small community in one 15 month period in Far Eastern waters are discussed and some recommendations as to further preventive measures suggested

ACKNOWLEDGMENT

I should like to thank S B P O T Bowler for his untiring and skilful work in preparing slides and treating patients and for his assistance sorting material for this article

REFERENCES

Wld Hlth Org Chronicle (1961) Vol 15 No 8
R N Medical Bulletin (1961) No 13
B M R, 775 (1) 1953

Note Since writing this article I have treated ten cases of gonorrhœa with the penicillin dosage indicated (1 MU crystalline and two doses each of 300 000 units of procaine) Only one case has required further antibiotic treatment

Reviews

HUTCHINSON'S TECHNICAL METHODS By Donald Hunter C B E M D F R C P and R R Bomford D M F R C P Thirteenth Edition Pp xv 422 with 26 plates London Cassell & Company Ltd Price 42s

A new edition of Hutchinson's Methods cannot fail to arouse some degree of nostalgia. *Clinical Methods* was known as Hutchinson and Rainy then became Hutchinson and Hunter and now it is Hunter and Bomford in this new fourteenth edition the first to be published since Sir Robert Hutchison died at 1960

The task facing the present authors was formidable weeding out the old wood and introducing only what is new and proven and they must be congratulated on keeping the length of the book within bounds The 653 pages of the seventh edition became 579 in the nineteenth edition and now 422 in the modern more handy format The production is excellent and printing errors few contrasts for centimetre (page 396) catches the eye and the index reference to albuminuria should be page 214 and not page 216

When a book was your student guide it is inevitable that you will examine its new editions with a critical eye What fun it is to see some of those old pictures again even if the portrait in plate 24 was Rickets in 1940 and has now become Old Rickets certainly new plates have been added but some of the older examples could well be replaced Yet this book is very up to date with brief adequate references to the transaminases thrombocytopenic purpura and the Rose Waaler test Electrocardiography is well dealt with and the appendix has been expanded in recent editions with useful reference of normal values and a series of height weight charts which are in rather too small print for easy reading but at least the address of their publishing is given

The Ministry of Health might claim as the use of trade names for drugs rather than the approved names although the former are so much easier to remember but why do Decadrest Intolest and Acetest remain the index, but not Clinitest and what new uses Lipiodol or Neohydrol for bronchography (page 203)

Eponyms are useful but few physicians or surgeons will recall Ackerland's deformity of the rheumatoid cap (page 53) described in 1926 and rarely mentioned since then Correction of the Erythrocyte Sedimentation Rate for the degree of anaemia (page 163) hardly deserves the honour of being given the full referencing in the literature, since few of us correct today Some will regret that the CK levels of electrocardiography do not even get a mention and that the lumpers is not used to improve wax from the ear while others may not know that the figures given on page 408 for tuberculin reactors apply to the United Kingdom but certainly not in the United States of America

These few criticisms are made in the hope that the authors will improve *Clinical Methods* still more but even now this one of the best buys at only one guinea J M C

MAN AND RADAR DISPLAYS By C H Baker Pp viii 192 Oxford and London Pergamon Press Ltd Price 70s

This excellent book covers a far more general field than its title would suggest. Although it is a comprehensive study of the problems of assessing displays on radar screens the conclusions reached are applicable in all situations where man is required to interpret any visual or auditory display In all these systems complete automation is impossible and at some stage or other in the process man is required to make a decision This decision making is dependent on many personal factors such as training, motivation and fatigue One point that is emphasised is the importance of visual deficiency in the operators Both binocular vision and convergence must be of a high standard The fidelity for discrimination between signals is of the utmost importance and a great deal of the text is devoted to the description of various symbols which can be used to avoid confusion and lessen strain Three dimensional displays also receive consideration

The text is easy to follow and exceptionally well illustrated by graphs and tables. Finally a comprehensive list of 367 references gives the volume the necessary authority S M

VISUAL PROBLEMS IN AVIATION MEDICINE Edited by Armand Mercier M D Pp v 120 Oxford and London Pergamon Press Ltd. Price 40s

This volume contains the edited text of 14 papers presented at meetings of the Medical Panel of NATO's Advisory Group for Aeronautical Research and Development Subjects covered include visual problems of flight at high and low altitudes and in helicopters and V T O L aircraft visual standards in the selection of aircrew the perception of contact lenses and the protection of the eyes both in normal flight and against atomic flash There is a useful guide to the latest state of published knowledge and opinion in this field A detailed bibliography with chapters with other reports of international origin is also included the papers of mixed are in French Although English summaries are given full translations would increase the value and appeal of the book J K

THE PRACTITIONER'S HANDBOOK. By W. A. R. Thomson, M.D. Pp. xv + 711. London: Cassell & Co., Ltd. Price 63s.

There is a pleasurable sense of exploration on opening the pages of a new and unread book—a fresh discovery, an unexpected insight to some fact already known, or even just a felicitous phrase might excite one's interest. On reviewing this book it is not so, for all the contents are reprints of articles from the *Practitioner* published during the period 1946–1961.

The articles, which are written and revised by experts in their respective fields, are short and revisionary and cover over 250 subjects which are constantly encountered in one's everyday work. Two or three of the titles, Thinchild, who won't talk; Bank-clerk in Wonderland; The Frozen Shoulder; Contact Lenses; The barking cough, indicate the essential difference between this and the conventional textbook and show how wide is the spectrum of subjects.

It is a book which can be pleasantly and profitably picked up and read during any stray ten minutes. There are no charts or illustrations, the index, a most important point, is exemplary. The book is nicely bound in a Conservative blue and costs 63s., which these days is reasonably modest and represents extremely good value.

E. D. C.

PRINCIPLES OF REHABILITATION. Edited by W. Russell Grant, M.A., M.R.C.S., L.R.C.P., D.Phys.Med. Pp. xi + 76. 63 illustrations. Edinburgh and London: E. & S. Livingstone Ltd. Price 12s. 6d. + 1d. home postage.

This book gives an excellent survey of the problems to be considered in the rehabilitation of a patient. The principles are plainly defined and the means of achieving these are well covered by the numerous suggestions and practical methods discussed. A valuable chapter on the assessment of the patient is also included. Successive chapters deal systematically with the aids and appliances available for the slightly to heavily handicapped patient. The economical aspect is well stressed and numerous examples are given showing how ordinary utensils and stock items may be adapted or used to aid the patient. Where more expensive apparatus or conversions to homes are required, the statutory authorities and the regulations to deal with these are quoted, as well as the essential points which may need special consideration. The book is liberally illustrated by excellent diagrams and photographs. Simple diagrams of the daily living department, handicapped housewives, horticultural rehabilitation unit and mechanized bedroom are also included. The whole emphasis of the book is to suggest sound practical ideas to make a handicapped patient independent.

It will prove available to the medical profession as a supplementary to medicine and all interested in helping the handicapped to achieve personal independence.

J. S.

OPHTHALMIC NURSING. By P. Garland, S.R.N., S.C.N. Fourth Edition. Pp. 168. Many photographs and illustrations. London: Faber & Faber Ltd. Price 18s.

This book is intended as a textbook for the general trained and student nurse rather than for those in ophthalmic hospitals. As such it is successful.

It is arranged in sections covering examinations of the eye, common treatments and dressings, nursing of an patients and surgical nursing. The First Aid section is brief but probably adequate and there is a helpful glossary.

The clear photographs and diagrams are easily understandable and the book gives a straightforward and sensible approach to the nursing and management of eye conditions with the difficulties and complications that may arise.

C. F. C.

REPORT OF THE UNITED NATIONS SCIENTIFIC COMMITTEE ON THE EFFECTS OF ATOMIC RADIATION (General Assembly Official Records: Seventeenth Session: Supp. No. 16 (A/5216). Pp. 442. Sales Section, United Nations des Nations, Geneva. 35s. 6d.

This second report of the United Nations Scientific Committee provides a reasonably up to date summary of the knowledge of the effects of radiation on man and his environment. It reviews often a short account of the basic physics and radiobiology, the known effects of irradiation on the individual and on the progeny of irradiated individuals. The sources and doses of radiation to which the human populations are exposed are summarized and compared before the main body of the text is completed by the conclusions and conclusions of the Committee.

The greater part of the text comprises a fairly detailed discussion of the technical aspects of the problems concerning the Committee. As it includes 2,960 references it constitutes a valuable source-book.

The report caters therefore for two groups of readers. The main but smaller part can be recommended to those wishing to gain a comprehensive though superficial view of the whole field, while the second part contains much of interest to those doing research in or making a detailed study of the effects of radiation.

T. L. F.

PHYSIOLOGY [illegible] X R[illegible] By [illegible] George Simon, M.D., F.F.R. [illegible]

[illegible]

… is carefully written … reproduced with 38 new … knowledge has been … corrected and the … improved … quality glossy paper …

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L. G. I.

[illegible] Dis[illegible] B. M[illegible] and Ralph S[illegible] Black and white illustrations [illegible] W. B. S[illegible]

[illegible]

… The text … illustrations are clear and helpful … the medical student … and for the tender rather than … students …

E. D. C.

CONNECTIVE TISSUE MASSAGE. By Maria Ebner. Pp. xii + 220. Two colour plates and many black and white photographs and illustrations. Edinburgh and London: E. & S. Livingstone Ltd. Price 30s. (1s. 9d. postage).

Connective tissue massage requires techniques not normally associated with the conventional forms of massage used in the British Isles. It was originated in Germany by Frau Elisabeth Dicke, a physiotherapist. The results achieved by this method of massage (Bindegewebsmassage) have been investigated clinically by Professors Veil and Kohlrausch as well as by Dr. Teirich Leube. It is used on patients whose condition is connected with visceral disease and the treatment of patients with diseases associated with peripheral circulation. Its use is well established in most countries in Europe. The claims made by the German workers are substantiated by the author who has obtained similar results while working at the General Infirmary, Leeds. No satisfactory explanation for the results obtained can be found [illegible] purely neurological reflex or scientific basis.

The book is divided into five sections of about equal length, dealing first with the anatomy, function and circulation of connective tissue as well as vascular innervation; this is followed by a detailed description of the technique of connective tissue massage, which is well illustrated by photographs and drawings. The effects and their therapeutic applications of the massage are discussed in some detail. Finally the [illegible] of patients are given in reasonable detail with their progress.

The book is intended as a reference book for physiotherapists who have been instructed in these techniques or for those wishing to know more about this particular method of treatment and its application.

J. S.

HANDBOOK OF CLINICAL CARDIOLOGY By Hamold W Salmon M D M R C P Pp viii 179 Ten black and white X ray plates London Harvey and Blythe Ltd Price 25s

There are many books to choose from on cardiology ranging from the compendious to the concise description of special techniques and cardiography

The author hopes that this book will be of some value to house-officers and general practitioners even if only its a rapid reference when treatment is in doubt

Handbook of Clinical Cardiology is however more than a dictionary of treatment. Compressed into 179 pages is a general outline of the subject with brief references to most tests and techniques and a fuller description of the accepted treatments

Congenital malformations occupy 12 pages but most of this chapter is given up to clinical description and perhaps more guidance might have been given to the practitioner as to the best time at which to refer his patients for further investigations with a view to possible surgery

Perhaps also it is surprising to find cardiac arrest and external cardiac massage omitted

The general style may irritate some tending to be dogmatic and aphoristic this is perhaps due to extreme compression on much of the book reading like expanded lecture notes

There are ten excellent radiographs grouped in the middle of the book The author's clinical sense might almost may anti-scientific bias is perhaps illustrated by the random numbering of the few badly reproduced electrocardiograms one-half of which bear the legend E G C

In spite of these criticisms and the coarse paper on which it is printed the author has in the main achieved what he set out to do in a volume of reasonable size and at a reasonable price. E E P B

SHAKESPEARE'S MELANCHOLICS. By W I D Scott Pp 192 London Mills & Boon Ltd Price 21s

In his book Doctor Scott emphasises the immortality of Shakespeare's plays which have appealed in different ways to successive generations and now in an age when psychiatrists are very much to the fore have an interest and appeal to a new and inquisitive audience

This modern interest should arouse new interest in the well known plays and will bring to some of them a scientific rather than an artistic enjoyment and acceptance

Basically it is a study of Shakespeare's melancholics but goes much further to explain the melancholy of the whole Elizabethan era The characters still very much alive today are shown in a new light Leontes is the Paranoid Parolles the Schizophrenic and Hamlet the Maniac Depressive

Although there is a tendency for the descriptions to become at times somewhat technical the author does help the lay reader by fully explaining some of the terms

The work will be of interest to both psychiatrists and students giving the latter a better understanding of the Great Poet and perhaps even producers of the plays will be more successful from a study of their new look at some of the characters

The book is well written and easy to read It will though as appeal may be somewhat limited, be appreciated by any intelligent reader with a love of Shakespeare. P M M

AN INTRODUCTION TO PHYSICAL METHODS OF TREATMENT IN PSYCHIATRY By W Sargant M A M B (Cantab) F R C P E Slater M A M D (Cantab) F R C P, and assisted by P Dally M B (Lond) M R C P Fourth Edition Pp xi 331 Edinburgh and London E & S Livingstone Ltd Price 30s

It is nine years since the third edition of this work was published It is a small measure of its international reputation to say that it has been translated into German French Spanish Greek and Swedish

This fourth edition lives up to the very high standard of the previous editions In view of the recent major advances in psychiatric treatment, the authors have found it necessary to alter the general outline and emphasis of the book in order to bring it into line with present day forms of treatment.

An enlarged and rewritten chapter on chemicals sedation and stimulation gives a good account of the indications and side effects of the Phenothiazine derivatives The section on the anti-depressant drugs give a lucid account of their uses and limitations. The authors have wisely chosen only three of the many on the drug market to describe in detail, viz Iproniazid (Marsilid) Phenelzine (Nardil) and Imipramine (Tofranil) Many practitioners would benefit from reading this account

The chapter on Diet Vitamins and Endocrines has been completely rewritten by John Pollitt His broken particular reference to the treatment of anorexia nervosa in which he stresses the importance of chlorpromazine There is also an interesting account of the treatment of homosexuals with hormone therapy

The book gives an authoritative description of the treatment in current use in psychiatric practice in the United Kingdom It is therefore a most useful textbook for the student of psychiatry and a most useful book of reference to the physician and general practitioner This book is recommended therefore to all those interested in psychiatry N L

DISEASES OF THE NERVOUS SYSTEM By Sir Francis Walshe M D D Sc F R S F R C P Tenth Edition Pp xii 381 60 plates and illustrations Edinburgh and London E & S Livingstone Ltd Price 35s

Many try to write a brief hand book on their own specialty and all but a very few find that their volume is ill received at no one the understandable hunger appetite wherein but the information inadequate the general practitioner is rather similarly placed and the potential specialist requires a true reference book Yet Walshe succeeds born with the Battle of Britain in 1940 it has already reached its tenth edition with translations into French Greek Italian and Spanish

There is no difficulty in finding the reason for the success of this volume The grammar is usually impeccable descriptions of disease processes are adequate yet not overburdened with detail and treatment is up to the minute Some will wonder whether Chapter XIV on liver brain inhibitorships and the neurological consequences of their disorders (written by the author's son Dr J M Walshe) should find a place in a book of this type but it is a fact valuable in demonstrating the advances now being made in neurological medicine The brief bibliography at the end of most chapters rarely contains references to literature more than five years old and the title of the paper is usually given but not at the end of Chapter XXI (page 278) The index is much improved in that there are fewer cross-references but Librarianship has yet to reach index status

The author is to be congratulated on his continued fight against eponyms—there are only 29 in the index, but the note on page 23 concerning eponymous signs loses some of its effect because it refers to the preface of the first edition which is not reprinted in this tenth edition

If there is to be any minimum of this book one can ask why cervical spondylosis gets mention on only pages 248 249 in Chapter XVI (and cannot we for ever lose spondylitis in this association?) while lumbar disc protrusion and sciatica melt the whole of Chapter XXVI instead of being relegated to an orthopædic textbook No one will accept arteriographically determined (page 124) as the most simple expression in our cumbersome language and many will regret the absence of a chapter on neurological investigations in the laboratory and X ray department

This is a brief eminently readable book and this new edition cannot fail to increase its remarkable reputation at only 35s all can afford it and benefit from it J M C

We acknowledge with thanks receipt of the following publications

Annales Medicales Internes de Lyon Annali di Medicina Navale Australian and New Zealand Journal of Surgery Australian Journal of Experimental Biology and Medical Science British Journal of Surgery British Medical Journal British Medical Bulletin Broadway Gamma Journal of Medical Sciences Guy's Hospital Gazette International Review of the Army Navy and Air Force Medical Services Journal of the Irish Medical Association Journal of the Royal Army Medical Corps Kumoh Medical Journal Kumamoto Medical Journal Medical Digest Medical Journal of Osaka University Medical Services Journal Canada Middlesex Hospital Journal Mihon Medicus Montreal Medical Proceedings of the Staff Meetings of the Mayo Clinic Revista de Medicina Aeronautica E. Spaziale Revista Medica Revue des Corps de Sante des Armees Sheffield University Medical Society—North Wing Snakes Alive St Thomas's Hospital Gazette Snakebite Tuberculosis Aikakauskirja The Tohoku Journal of Experimental Medicine Tropical Diseases Bulletin Ulster Medical Journal Wakayama Medical Reports World Health Organization Chronicle Yokohama Medical Bulletin

News of the Services

OBITUARIES

Surgeon Lieutenant Commander C N BARNES died on the 4th February 1963 in R N Hospital Haslar He was aged 31 years

He qualified M B B Ch and entered the Royal Naval Medical Service on 26th July 1956 as Ty Actg Surg Lieut for Full Time Nat onal Service He transferred to Short Service Commission on 15th December 1956 On 25th July 1957 he was promoted Surgeon Lieutenant and was transferred to the Permanent List on 1st April 1960 On the 1st April 1962 he was promoted Surgeon Lieutenant Commander He was placed on the Retired List (medically unfit) on 23rd November 1962

E B M writes The death of a young man of great promise is always tragic Chris Barnes was such a young man He seemed to have all the qual t es that would carry him to the top—great professional ability h gh ends, youthful diligence devotion and a great personal warmth and charm Whatever he did he left wholeheartedly

To learn suddenly that he was incurably ill was stunning Yet it was in this illness that one saw Chris at his finest He quickly organized his affairs for the best against the inevitable end yet never showed other than that life was going on normally It was not just courage It was a quality of gentleness that carried his family and friends along

Our deepest sympathy goes to his w dow his children and his parents in their loss of this most loveable man

Surgeon Commander W C CARSON R N (Rtd) died on 23rd December 1962 He was born on 22nd May 1887 He qual fied L R C P and L R C P S and entered the Royal Naval Medical Serv ce as Surgeon Lieutenant on 19th November 1907 He was promoted to Surgeon Lieutenant Commander on 13th September 1915 and Surgeon Commander on 13th September 1921 Surgeon Commander Carson was placed on the Retired List (Age) on 22nd May 1932

Surgeon Captain C N RATCLIFFE R N (Rtd) died on 14th January 1963 He was born on 9th June 1894 He q ualified M R C S L R C P and entered the Royal Naval Medical Service on 1st December 1916 as a Surgeon Lieutenant He was promoted to Surgeon Lieutenant-Commander on 18th October 1922 Surgeon Commander on 18th October 1928 and Surgeon Captain on 31st December 1947

Surgeon Captain Ratcliffe was an Honorary Physic an to His Majesty King George VI on 31st December 1948 (K H P) He was placed on the Retired List (medically unfit) on 18th April 1951

NEW ENTRIES

Surgeon Lieutenants M D Davies M B B Ch I F Devlin M B B Ch B A O D N Davies M B B Ch M A Rowton Lee M A B M B Chir F St C Golden M B B Ch B A O (D) J L Bindbeet B D S

PRE-REGISTRATION ENTRIES

A Surgeon Lieutenants C J Moon M B B S W M Abbott M B Ch B D T Mansir M B B Ch M R C S L R C P

ENTERED AS MEDICAL CADETS

Surgeon Sub Lieutenants P N Brudey M J Blyth G B Coombes J B O Meara K T Duffy N E Scholes J R Harrison B S George and S McHugh

RE-ENTRIES

Surgeon Lieutenant Commanders H R T A McLeod M B B S M R C S L R C P and N L Denham M B Ch B D A

TRANSFERS TO THE PERMANENT LIST

Surgeon Lieutenant Commanders (D) R C R Eve L D S
Surgeon Lieutenants A E Rampling M R C S L R C P J P Gornall M R C S L R C P (D) J Hird B Ch D L D S

SHORT SERVICE COMMISSION CONVERTED TO FIVE YEARS

Surgeon Lieutenants C J M Maxwell M R C S L R C P H S C[illegible]t M B B Ch M R I S L R C P D F Munt M B B S N Carr M B Ch B F W Pick M B B S D M P Ralph L D S

SHORT SERVICE COMMISSION CONVERTED TO SIX YEARS

Surgeon Lieutenant (D) C C Berwick L D S

PROMOTIONS

To Surgeon Rear Admiral Surgeon Captain M H Adams M B B Ch D O M S and Surgeon Captain J M Holford *O B E* M B M R C S F R C P I Lond I

To Surgeon Lieutenant-Commander J B Odgers M B Ch B R F Doherty M B B S I M Mcintyre M B Ch B D A J W Harding B A M B B Ch (D) C J Meryon B D S L D S I M Middlemass L D S and W J Gregory L D S

Provisional selections in date 30th June 1963

To Surgeon Captain R F May M R C S L R C P R P Phillips *O B E* M B B S D O P W Edmondson M R C S L R C P D C P F B B Weston M R C S L R C P (D) J B Inverdale L D S

To Surgeon Commander R S Forrester M B Ch B D C P J D Stewart L R C P L R C S L R F P S D I H D P H J G H Sheppard G M M B B S K P O'Byrne L R C P & S D P H H J A Hehir M B B S M R C S L R C P D O J F Kynn M B B Ch (D) B H Manning L D S and J K Colville L D S

Promotion to Surgeon Lieutenant ex Pre-Registration

A J Reed M B B S and commences five years Short Service Commission

RETIREMENTS

Surgeon Rear Admiral W V Reach *C B O B E* Q H S Placed on Retired List

Surgeon Captain (D) W B Tyler L R C P L R C S L D S Placed on Retired List

Surgeon Commander C J Mullan M B B Ch Placed on Retired List (Age)

COMPLETION OF SHORT-SERVICE COMMISSION

Surgeon Lieutenants C I Haines C J Buckhouse R K Clarke L T Jones J F Bench A J Finn M J O Shea G B Hunt I Morrison M C I Wilkes J T Hutton P W Clement I M Kyles N F V Marshall (D) J E Jenkyns

WARDMASTERS

To Acting Wardmaster Snb Lieutenants S R C P O Ross and S B C P O R S Radcliffe

Retired Wardmaster Lieutenant W B Ford (Age)

QUEEN ALEXANDRA'S ROYAL NAVAL NURSING SERVICE

To Superintending Sisters Missis M E Collins and I R Owens

ROYAL NAVAL RESERVE

NEW ENTRIES

Surgeon Lieutenants F F A Capps M B B S D Obst R C O G and D B Millons L R C P M R C S M B & B S

PROMOTIONS

To Surgeon Captain Alan Raffmann and Alvan W Hagger

To Surgeon Commander K M Buckhouse

To Surgeon Lieutenant Commander T D L Thomas

To Acting Surgeon Sub Lieutenants D A White and M W E Morgan

RETIREMENTS

Surgeon Captain W E Kershaw V R D Placed on Retired List (Age)

Surgeon Captain (D) J Symmons V R D Placed on Retired List (Age)

Surgeon Commander R I Bence Placed on Retired List (Age)

Surgeon Lieutenant Commanders M Murray A A Murray M Wickham G P Hartigan T J R Harley D J D Perrins M G Low J E K Moore J G Byrne J M Planer R D Pett and (D) J P Page V R D

Surgeon Lieutenants J F Masterton and K H Lewis

ADMIRALTY FLEET ORDERS

(This page is perforated for filing purposes)

2133/62 —Cowglen Military Hospital—Closure

2267/62—Hospital and Sick Quarters—Civil Hospitals and Sanatoria—Military Administrative Officers

2486/62 —Form M 227—Dental Log Book—Introduction

33/63 —Advancement of Sick Berth Staff and Q.A.R.N.M.S.(A.)—Form S 453

113/63 —Sick Berth Staff Technicians—State Registration Under the Professions Supplementary to Medicine Act, 1960

143/63 —Medical—Mass X-ray Arrangements in the United Kingdom—Inter-Service Scheme.

147/63.—Dental Treatment—Administration of Antibiotics

213/63 —Medical-Seaman Branch—G.A.2—Eyesight Standards.

218/63 —Ratings—Seaman Branch—U.C. Ratings—Care of Hearing.

220/63 —Training—First-Aid Training for Naval Personnel

238/63 —Correspondence—Addresses—Method of Despatch and Address—H.M.S. *Mauritius*

282/63 —Surgeons and Agents (Admiralty)

312/63 —Medical Documentation—Need for Prompt Completion and Forwarding to Medical Director-General of F.Med.1ds

No 3 Summer 1963 Vol XLIX

Journal
of the
Royal Naval Medical Service

PUBLISHED QUARTERLY

(The Admiralty does not accept responsibility for the opinions expressed in this Journal)

PAGE

EDITORIAL 153

ARTICLES—

The Royal Naval Medical Club Dinner 1963 154

The Re-birth of the Royal Naval Hospital Gibraltar 156

A New Medical Centre for H M Dockyard Chatham By T P OLIVER L M S S A R N 161

Man Induced Hyperpyrexia By SURGEON COMMANDER T A TURNBULL M R C S L R C P D A R N (Retired) 169

Thermal Comfort in a Small Warship By SURGEON LIEUTENANT D A NOBLE R A N 176

The R N Audiometric Trailer Unit By SURGEON LIEUTENANT-COMMANDER R R A COLES M B B Ch D L O R N LIEUTENANT A A HERON R N (Retired) and J J KNIGHT Ph D 188

Ageing in the Royal Navy Part IV (Conclusion) By SURGEON LIEUTENANT COMMANDER W B WRIGHT M B Ch B M R C P (Edin) R N (Retired) 195

Double Sided Bath for Contrast Bathing By SURGEON CAPTAIN H E B CURJEL Q P H M B B S M R C S L R C P R N 202

The Rhythm of Venereal Infection in a Ship's Company By SURGEON LIEUTENANT J A SAVIN M A M B Ch B R N 203

CLINICAL CASE—

Removal of a Broken Kuntschner Nail By SURGEON LIEUTENANT COMMANDER K T HESKETH M B B S F R C S (Edin) L R C P R N 208

REVIEWS 209

NEWS OF THE SERVICE—

Obituaries Honours and Awards Higher Qualifications Consultant Appointments Promotions New Entries Re-Entries Pre Registration Entries Transfers to the Permanent List Retirements Completion of Short Service Commission Wardmasters Queen Alexandra's Royal Naval Nursing Service—Royal Naval Reserve Civilian Appointment of Retired Royal Naval Medical Officer 212

ADMIRALTY FLEET ORDERS Inside Back Cover

EDITED BY
THE STAFF OF THE ROYAL NAVAL MEDICAL SCHOOL
ALVERSTOKE HAMPSHIRE



SURGEON VICE ADMIRAL D. D. STEELE PERKINS
CB CVO OHS FRCS(Ed) FRACS DTO

Editorial

The Medical Branch of the Navy will be [illegible] welcoming Surgeon Vice Admiral D D Steele-Perkins C B C I O Q H S I R C S (Eng) F R A C S Ð L O as its new Director and wishing a happy and long retirement to his predecessor Surgeon Vice Admiral Sir Robert Panckridge K B E, C B Q H P M R C S L R C P

Very few of us can realize the arduous responsibilities which the Director must accept especially in this present era when the Medical Branch must keep pace not only with the rapidly developing scientific transformation of the Navy but with the whole changing pattern of civilian medical practice

We are grateful to Admiral Steel Perkins for allowing us to reproduce the photograph and wish him every success during his term of office

Articles

THE ROYAL NAVAL MEDICAL CLUB DINNER, 1963

THE annual dinner of the Royal Naval Medical Club was held in the Painted Hall at the Royal Naval College Greenwich on Friday 26th April 1963

The President Surgeon Vice-Admiral Sir Robert Panckridge delivered the following speech

It has become customary for M D G at this dinner to review happenings in the Naval Medical Service during the past year I shall not weary you with details, but will try to give you the highlights

First the Hospitals

During my time of office the Navy has taken over control of B M H Mauritius the David Bruce Military Hospital in Malta and the British Military Hospital Gibraltar In this I have received the greatest help and co operation from General Sir Harold Knott and his Department and for this I sincerely thank him

We are now faced with the task of making a success of these ventures and of maintaining the high standards reached by our Sister Service I can only say that we shall do our best

In Malta we shall continue to be for some time rather uncomfortably divided between Bighi and Imtarfa but I hope that before long approval will be given for the rebuilding and modernization which will enable us to concentrate on the one building at Imtarfa

'I am able to report substantial improvements in the career prospects of medical officers

'Following approval received for consultant status boards have been convened under the aegis of the three Royal Colleges and up to date 28 consultants have been accepted

Boards will continue to be held at regular intervals as senior specialists become eligible and recommended for selection Obviously there must be some disappointments but I am sure that this new grade will offer better prospects for the keen and well-qualified man and will remove a rather invidious distinction in terminology between those who specialize in the Services and in civilian life We expect also to announce the appointment of dental consultants in the near future

During these last few months approval has been received to increase the establishment of our senior specialists by ten This gives the branch a total complement of 129 consultants and specialists the complement of medical officers including short service officers being 388

All this of course is only made feasible by improving and extending our facilities and opportunities for post graduate training I feel I can claim that the percentages of doctors in the Naval Medical Service with higher qualifications will bear favourable

comparison with other cross-sections of the medical population of this country

I am sure that many of our distinguished civilian colleagues here tonight are often asked by young doctors what they think of their prospects of specializing in the medical branch of the Armed Forces I hope you can reassure them that the keen and able man will not lack the opportunity, and indeed will be given every encouragement

We shall be improving our training facilities both for the sick-berth staff and for our Naval Nursing Auxiliaries by making our hospitals in Haslar Plymouth and Malta complementary to one another for this purpose This scheme has received approval from the General Nursing Council

It has been my policy to try to increase the number of billets open to retired medical officers in a civilian capacity rather than to raise the age of retirement I know this is a controversial matter but my fear has been that to raise the age of retirement in a small Service such as ours would block promotion and specialization and thereby have a depressing effect on the younger medical officer furthermore I cannot appoint geriatric old gentlemen to sea appointments

I regret to state that *recruiting* is still a matter for concern though my remarks apply to the short-service commission rather than the permanent list.

Our cadet scheme for the appointment of senior medical students as surgeon sub-lieutenants is going forward, and up to date the response has been fair 55 applications 38 acceptances some of the rejections being medically unfit and another 15 awaiting interview next month The enrolment of surgeon sub-lieutenants R N R is most satisfactory We also have two dental surgeon sub lieutenants R N R in the London Division but none as yet in the other divisions

I understand the civilian consultants as well as general list officers and medical officers who sit on these selection boards have been well pleased with the type of student applying and they come from many of the medical schools in the British Isles The first batch have already completed a course of training at Portsmouth Barracks and made an excellent impression

I now turn to the Dental Branch which is in a flourishing state of health

The recruiting position is at present good we have the full number of establishment allowed and we expect to fill the vacancies for 1963 from direct entry

The cadetship scheme on the same lines as that of the medical branch has recently been introduced and the first board is expected to be convened in May Dental students will be eligible to apply in their last two years for a short-service commission of five years This is expected to help cover the retirements of 1964 and 1965 when a large number will be leaving the branch The majority of entrants will continue to be recruited by direct entry

Research into the uptake of radio active strontium begun by Surgeon Rear Admiral Holgate is carried on by his successor at Alverstoke with the support of a group of civilian dental surgeons drawn from all parts of the country I am happy to say that several of them are with us here tonight The Royal Navy continue to accept responsibility for the dental aspect of the national survey into the distribution of nuclear fall out This work involves the effect of internal radiation and it has led to further researches into cell behaviour—especially with regard to malignancy Surgeon

Commander (D) Starkey by labelling chromosomes in the jaws of young rabbits has been able to make important contributions to the present understanding of cell turnover

There are two activities which have taken place during the past year which I think members might be interested to hear about Medical support for the Commando Brigade serving in the Far East is now provided by a surgical team which is available to fly out direct from the U K at a matter of hours notice This arrangement was called into action at the recent trouble at Brunei The great advantage is of course that specialist personnel can be provided at short notice without the need for their being stationed abroad for long periods under conditions in which it is impossible for them to maintain practice in their specialities I think the possibility of such employment is stimulating and appeals directly to those with a taste for excitement and adventure

My other item is an interesting piece of co operation with the French Navy with whom extensive trials were conducted into the sink-rate of submerged aircraft Surgeon Commander Rawlins and Surgeon Lieutenant Commander Davidson played an invaluable part in the organization of this international enterprise and by their diving and underwater photography helped in producing a most graphic film of the trials

Concluding Remarks

"My own period of office is now almost at an end and this is the last time I shall have the honour of presiding at this dinner I may perhaps be permitted a few remarks from a more personal point of view

I well remember my predecessor Sir Cyril May saying to me "You will have a hard row to hoe as a result of the rescinding of National Service How right he was and it remains an uphill struggle in spite of the "New Look

"I have no doubt at all that what has been achieved for the improvement of the medical branches of the Armed Services during the last three years is because the three Directors-General have worked together and supported each other This co operation has extended down through our respective departments The days of cut-throat rivalry between our branches are a thing of the dead past. My own task has been greatly lightened by the help and sympathy I have received from the secretariat I have very much appreciated this I also thank my civilian consultants for support help and advice They have been a tower of strength

Finally I offer my successor Surgeon Rear Admiral Steele-Perkins my very best wishes and all good fortune

"On behalf of the members of the club I now welcome our guests and say how very glad we are to have you here with us tonight

Our Guest of Honour *The Right Honourable The Lord Carrington* First Lord of the Admiralty It is not my intention to give you a thumb-nail sketch of his distinguished career From the moment I first called on him on taking up my present appointment, the First Lord has shown sympathy and understanding towards our medical and dental problems Last year he travelled to R N Hospital Plymouth in order to unveil the plaque commemorating the 200th Anniversary of the hospital

in spite of the fact that he was at that time heavily engaged in a political programme This gesture on his part was greatly appreciated by my branch I know I express the feeling of all of you when I state how honoured we are that he is with us tonight

"We are also honoured in having with us the Presidents of the three Royal Colleges

'*Sir Arthur Porritt* needs no introduction He has been a stanch friend to me and to our branch during my term of office I am also grateful to him for in spite of his very heavy commitments, he appointed himself the Chairman of the Selection Board for Consultants in Surgery and Associated Specialties. I know I am expressing the feeling of the D G s of the Army and Royal Air Force in thanking him for this personal interest that he has taken in raising the professional status of the medical services of the Armed Forces

' *Sir Charles Dodds* has known me since my student days He tells me that he never suspected when I was one of his students he had an embryonic M D G amongst them A somewhat ambiguous remark gentlemen! I was delighted when he was elected President of his College and wish him all success I wasted no time to ensure that his many commitments would also include an acceptance to this dinner

Mr A C H Bell whom I thanked publicly at this dinner last year for the interest and help we have received from the Royal College of Obstetricians and Gynaecologists in launching this specialty in the Royal Navy I am pleased to report Sir that all is well

"*Sir Ian Fraser* who has always taken a keen interest in medical education and is a popular teacher in the Belfast Medical School As President of the B M A he is well aware that the Services rely on the goodwill and co-operation of the Association in recruiting doctors May I congratulate you Sir on your Knighthood

We are delighted to have *Mr Mason* the President of the British Dental Association with us together with other distinguished members of the dental profession

I would wish to welcome especially warmly my friends and colleagues the Directors-General of the Army and R A F Medical Services Lieutenant General Sir Harold Knott and Air Marshal Sir Richard Nelson I congratulate them both very heartily on their Knighthoods Sir Richard in fact, pulled off a right and left as he was promoted Air Marshal on the same day

' I now welcome Rear Admiral Giles Admiral President of the Royal Naval College and the Captain and Commander of the College They are our guests but we are also their guests—and I know that all our members will wish to join in thanking them for allowing us to be here tonight and to enjoy these truly splendid surroundings which have been an inspiration to many generations of naval officers

"Last but far from least I welcome Rear-Admiral Martell Admiral Commanding Reserves and Commodore Young, who is the Commodore Royal Naval Reserves

I greet, too the Trinity of the Chaplain of the Fleet the Senior R C Chaplain and the Senior Methodist Chaplain Gentlemen if the destruction which overtook the Chaldean King when he was feasting with convivial company in *his* Painted Hall were also to befall us here tonight we should at least be in safe company

"My Lord Members of the Club I shall now ask you to rise and drink to our Guests "

THE RE-BIRTH OF THE ROYAL NAVAL HOSPITAL, GIBRALTAR

After an interval of 35 years there is again a Royal Naval Hospital Gibraltar. The fabric of the old hospital remains on and is still affording useful domestic accommodation for naval and dockyard officers in what is a crowded community. It has not



Captain R. S. Adie, Late Commanding Officer of the Royal Naval Hospital, Gibraltar, and Captain H. T. [illegible], R.N., Commanding Officer of the Royal Naval Hospital, Gibraltar



The scene at the hospital as the Royal Army Medical Corps flag is lowered for the last time and the Union Jack raised in its place

been resuscitated The re-birth has been achieved by the transformation of what was the British Military Hospital into the new Royal Naval Hospital This is not a piece of news It has been anticipated for months and has formed a talking point in all of our medical messes

At 1100 on 1st April, 1963 it became an actuality and the event was signalized by a brief but quite effective, little ceremony carried out in the presence of His Excellency the Governor, General Sir Dudley Ward, *G C B*, *K B E*, *D S O* and a

representative body of guests, which included the Second Sea Lord Admiral Sir Royston Wright *K C B D S C* and the heads of all the three services in Gibraltar

His Excellency The Governor was accorded a Royal Salute on his arrival and was escorted to his position by Colonel R St J Lyburn (late R A M C), the outgoing Commanding Officer The small parade having been called to attention the bugles sounded off the General Salute while the flags were ceremonially exchanged on the hospital flag staff—that of the Royal Army Medical Corps being lowered, and its place taken by the Union Flag as is customarily worn in all Royal Navy hospitals The incoming Medical Officer-in Charge Surgeon Captain W J F Gould *C B E* Q H S R N, then addressed the assembled company as follows

"Your Excellency Ladies and Gentlemen we have just seen carried out the traditional method of signifying change of control We of the Royal Naval Medical Service are honoured by our selection to succeed the Royal Army Medical Corps in running this excellent hospital and in furnishing hospital facilities for the three Services stationed on the Rock We hope—indeed intend—to maintain the same high standard which they have set This moment of handover is not an act in isolation It is the culmination of many weeks of preparation much hard work and effective inter-Service co-operation My part in all this has been small Yours Colonel Lyburn has been a material one As a small token that we really do appreciate this fact may I request of you a last symbolic contribution—that you should now unveil the plaque bearing the new name of the hospital

At this point Colonel Lyburn turned and pulled the cord releasing the covering flag from the plaque bearing the legend ROYAL NAVAL HOSPITAL GIBRALTAR in white letters on a blue background In such an assembly emotion is never demonstrated outwardly, but it is probably fair to say that it could be sensed none the less For the R A M C personnel present it was a cruel wrench

Colonel Lyburn then spoke paying similar tribute to the easy relations which had characterized the transfer details at all levels and expressing on behalf of his Corps, best wishes for happiness and efficiency in the new Royal Naval Hospital

The Medical Officer in Charge then formally requested His Excellency permission to conclude the proceedings and to honour his staff with his presence at a small informal reception which followed

A NEW MEDICAL CENTRE FOR H.M. DOCKYARD, CHATHAM

Surgeon Lieutenant-Commander T. P. OLIVER, R.N.

ONE of the problems confronting a factory with an industrial medical department is the provision of suitable accommodation for that department. The following pages are a description of how this problem was tackled in one of Her Majesty's dockyards where an industrial medical service was in operation but where the surgery building was inadequate.

Historical Background

The Royal dockyards were amongst the first industrial establishments to set up an industrial medical service for their employees and at Chatham Dockyard there has been at least one medical officer since 1688. Unfortunately however the accommodation provided has not always kept pace with the progress in this field of medicine.

As long ago as 1859 Doctor Gunn the then Senior Medical Officer of this dockyard wrote to the Captain Superintendent:

"I beg to represent to you how inconveniently small the present surgery is and how inadequate it is for the accommodation of the sick and hurt belonging to this yard . . . its situation is also most inconvenient being placed in a corner of the yard.

"I have therefore to request that you will move My Lords Commissioners of the Admiralty that they may be pleased to sanction the erection of another surgery in some more convenient situation in the yard."

During the succeeding century various additions were made to the surgery building resulting in a chaotic arrangement of rooms some without windows many with doors in the wrong places dark corridors and miscellaneous glory holes.

In the last three years a reorganization of the management structure in the dockyard has taken place and further the Nore Command and the Royal Naval Hospital Chatham have been closed. Resulting from this redeployment has been a redistribution of office accommodation and the building of a new office block. Following the move of the Commander-in-Chief The Nore's staff a building became vacant within the dockyard which was offered by the Admiral Superintendent to the medical department. In considering the suitability of the building it was felt that two factors were of prime importance namely that the site was suitable and that conversion of the building could be successfully achieved.

Choice of Site

In siting the medical department in any factory it is important to bear several points in mind. It is advisable to ensure a relatively quiet central position with easy

access and egress particularly for ambulances and preferably situated within easy distance of the personnel welfare and safety departments with whom the medical department works in close co operation

In Chatham the dockyard is L shaped each arm of the L being approximately ¾ miles long the whole being some 500 acres The old surgery was situated at the end of one arm of the L in a cul-de-sac well away from the main concentrations of labour and some 700 yards from the personnel department The building offered for the new medical centre was situated in the corner of the L within 200 yards of the largest single labour force and within 160 yards of the personnel department There was unrestricted access for ambulances Thus the building offered satisfied the requirements as to site

Suitability for Conversion

As the building was already in existence it was necessary to ensure that it could be converted to a medical centre successfully and at a cost which would not make it an uneconomic proposition

It was a two-storey building of brick construction with a tiled mansard roof and very good natural lighting from an adequate window area There was a central stone staircase and a usable floor area of 2,500 square feet per storey There was coal fired central heating but no domestic hot water supply Adequate sanitation existed on both floors Apart from the staircase well and the north wing of the ground floor no brick-built dividing walls were present the other wings of the building being divided by matchboard partitions faced on one side only Apart from the staircase well and the sanitation block all the floors were of wooden construction There was a flat area at the rear of the building suitable for an ambulance park and a separate car park for patients and visitors The conversion was considered to be feasible and would result in a medical centre in line with modern practice

Planning the Conversion

The detailed accommodation plan was drawn up by the medical officers on an outline plan of the building Brick partition walls were left untouched where possible but wooden partitions were considered as non existent On the top floor south wing, it was decided to give a consulting room to each doctor *en suite* with an office for the senior surgery assistant together with a typist s room and medical records room In the north wing of the upper floor were placed the sick office male medical examinations office and its ancillaries, together with the store rooms and dispensary On the ground floor south the male casualty department was sited whilst the ground floor north, was devoted to a complete women s surgery together with accommodation for the staff of the medical department It was desired to take out a window opening on the ground floor, south at the rear of the building to make an ambulance unloading bay The siting of necessary sinks and wash-basins together with a 100 gallon immersion heater for the supply of domestic hot water was also included in this draft

Draft plans for lighting electric power and telephone communications—to include an intercom system in addition to the extension telephones from the main dockyard exchange—were also drawn up by the medical officers

Each of the [illegible] plans was then discussed in detail with the appropriate dockyard departments [illegible] to effect the conversion Virtually no alterations were required to these drawings except in minor points to simplify the civil engineering

THE MEDICAL CENTRE

The general layout of the medical centre can be seen on the plan All the new partitions within the building are made of framed hardboard except the walls of the X ray room which are of brick construction and coated with barium plaster The walls of the consulting rooms are sound proofed with fibre glass Light is borrowed for the internal corridors by means of windows in the dividing partitions Flush doors are fitted throughout Ball catches and brass bow-handles are fitted to all doors Yale locks are fitted to the doors of the stores and record room but the fitting of internal locks to the other doors was considered unnecessary as there is no requirement for having them locked Corticence floor covering is laid throughout except in the treatment rooms theatre, laboratory and heads where washable gerflex is used All sinks and basins are fitted with running hot and cold water those in the treatment rooms and theatre being fitted with hospital-type mixer taps Fluorescent lighting is fitted in all rooms except offices and waiting rooms where spherical fittings are used The rooms are painted in a variety of pastel colours all the woodwork being painted ivory white with the corridors and waiting rooms a light mushroom in order to give a sense of continuity within the building

Consulting Rooms

These rooms have a communicating door to the senior surgery assistant s office They are carpeted and the windows are curtained A wash-hand basin is fitted in addition to desk and chairs there is an examination couch and a large bookcase unit The décor and furnishings create a pleasant atmosphere in keeping with modern trends

Senior Surgery Assistant s Office

The senior surgery assistant is the senior member of the nursing staff He acts as secretary to the medical officers and has delegated responsibility for the stores medical records and dispensing His office is tastefully furnished and includes a large bookcase unit specially designed to take the larger Admiralty Books of Reference and Standing Order Books The office is also used as a waiting room for senior dockyard officers visiting the department

Typist s Office

The typist s office is conventionally furnished It has its own door into the record room as the typist does a considerable amount of filing

Record Room

The record room is long and narrow Nineteen four drawer filing cabinets are lined along the outer wall these being used to hold the current medical records The medical records are filed alphabetically in individual foolscap folders These folders

(or dockets) are then placed in a "retro-mobile" filing system. Each of the filing cabinets is capable of holding 500 dockets. A table is provided between the centre cabinets for making up dockets and a wall rack above the table holds the folders and slides for this purpose. The long internal wall is built 6 feet from the outer wall to allow the filing drawers to be comfortably opened on to the front of the user. Placed on top of the four-drawer cabinets are ten two-drawer cabinets which hold the dockets of discharged workpeople. They are filed as foolscap folders only as a space-saving measure because they are not in regular use.

The system of filing adopted using foolscap manilla folders is preferred to the F Med 4 envelope. The latter is considered ideal when used with the F Med series designed to go with it but as the majority of dockyard medical records are on foolscap or quarto paper the use of F Med 4 system results in over-folded and eventually very dog eared records.

Male Medical Examination Office

Some 1 500 medical examinations of male employees are conducted annually. As both the medical officers are also the appointed factory doctors for the dockyard this total includes a large number of statutory examinations such as the periodic examinations of all "young persons" divers chromium plating workers workers with ionizing radiations and others. In addition certain examinations are required in accordance with the industrial staff regulations of the Admiralty. These include koontoters canteen workers drivers etc and the annual examination of workpeople over the age of 65. There are also the pre-employment medicals medicals for establishment and for those proceeding abroad on Admiralty service. Finally certain other examinations are undertaken in the interests of employees engaged on certain processes not covered by existing regulations.

All these medical examinations are by appointment in order that wasted time by both employee and medical staff is cut to a minimum.

Before the employee sees the medical officer the surgery assistant in charge of this office is responsible for preparing all the papers and medical records. He also undertakes such measurements and tests as may be specifically required for that examination including height weight eyesight tests and tests of colour vision and urine tests. He also arranges the chest X-rays and any prophylactic inoculations required by employees proceeding abroad. This is the reason for setting up a separate office to deal with male medicals and it is a full-time job for the surgery assistant in charge of this office.

The office is equipped to deal with the mensuration described.

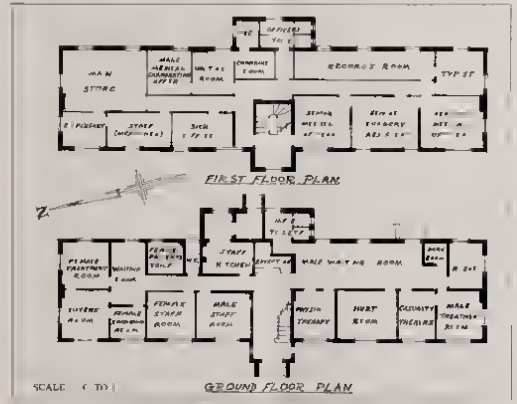
En suite with this office is a waiting room and a changing room off which leads a small "laboratory" for the taking and testing of urine specimens.

Sick Office

Some 30 000 sick certificates are dealt with by this office annually. The clerical assistant in the sick office is responsible for compiling the daily sick state and keeping a record card for every employee on which all periods of sickness are entered. The sick state is passed to the finance department daily, and the certificates to the Ministry



The new medical centre



Layout of new medical centre

of National Insurance The sick state is also graphically recorded In addition to the desk for the clerical assistant and a bank of filing cabinets for the record cards, a built in table with chairs is provided for employees to complete their certificates

Stores and Dispensary

The stores and dispensary consists of three inter connected rooms The largest room is used for victualling and naval store items (bandages first aid items soaps dishes glassware etc) A smaller room is used for medical stores (e g medicines syringes and X-ray films) This room also contains the D D A cupboard and a desk at which the store accounts are kept Both these rooms are fitted with sectional steel shelving giving 621 square feet of shelf space in the large store and 144 square feet in the medicine store

The third room is equipped as a dispensary and contains a sink together with a large formica topped work bench Shelves are built in for stock medicines medicine bottles and dispensary glassware A set of drawers holds corks labels chip boxes and other sundries

Reception

There is a built-in reception desk in the entrance hall with a hatch into the male casualty department Reception is always manned during normal working hours Apart from the obvious duty of directing patients to the right department the receptionist also looks after the male casualty card system makes physiotherapy appointments and mans the emergency accident telephone (similar to the 999 system)

Male Casualty Department

The male casualty department is entered by a two way swing door adjacent to the reception desk This opens into a waiting room furnished with tubular chairs and low tables for magazines The ambulance unloading bay opens into the far end of the waiting room through double doors

Opening off the waiting room are the various sections of this department

The hurt room is the casualty department consulting room, where all cases are seen by the doctor or by the surgery assistant on duty The room is furnished with a desk and a specially designed patients' chair with an adjustable head rest in order that eye cases can be easily examined A couch is provided for the examination of routine cases whilst there is a bay into which a trolley can be wheeled with casualties for resuscitative treatment or assessment before being sent to home or to hospital This avoids the necessity for transferring patients from ambulance to trolley to couch and back again A wash hand basin is fitted A store cupboard is also provided so that the surgery assistant in charge of the casualty department can keep a running stock of supplies for his department

The treatment room contains a sink unit with a formica working top on which a small sterilizer and water boiler are fitted a scrubbing-up sink two dressing trolleys, chairs and a glass instrument cabinet Injections re dressing and other treatments are given here and they are also undertaken at the written request of local general practitioners and hospitals in order to obviate wasted working hours

The small casualty theatre is adjacent to the treatment room and communicates with it. The communication was arranged in order to provide a larger theatre unit in the event of a major accident involving several serious casualties. The theatre is equipped in the normal way and includes a sterilizer bank (providing an instrument sterilizer and quantities of hot and cold sterile water) and an overhead theatre light. General anaesthesia is not normally undertaken.

In the X-ray room a Watson "Mobilex" machine is installed. The machine is mainly used for taking pictures of limbs to exclude or confirm fractures. Chest X-rays are not undertaken. The adjacent dark room is equipped with a developing unit with thermostat control together with the usual safe lights and viewing screen.

The physiotherapy room is used for simple rehabilitation. Exercises, massage and radiant heat treatment are given and this service is also undertaken for an employee at the request of his general practitioner.

Women's Surgery

The percentage of female industrial workers in the dockyard is 5 per cent. The women's surgery has therefore been built as a replica of the male side but on a much reduced scale.

The women's surgery is entered by a two-way door which opens into a waiting room furnished with tubular chairs and a table for magazines. All rooms open off the waiting room.

The office for the nursing sister is fitted out as a consulting room and here the medical officer sees the more serious casualties not dealt with by the sister and conducts the routine female medical examinations.

Opening off the waiting room and internally communicating with sister's office is a changing room for employees to dress and undress.

The treatment room also inter-communicates with sister's office. It is similarly fitted out to the male treatment room but in addition a couch is provided for physiotherapy.

The patients' toilet leading off the waiting room has a sanitary towel dispenser and incinerator.

Staff Rooms

A separate comfortably furnished staff room is provided for both the male and female staffs. The female staff room also contains the linen cupboard through which centrally heated pipes run.

A small staff kitchen and cleaners' room lies opposite the staff rooms.

COMPARISON WITH OTHER INDUSTRIES

It is natural that comparison will be made with the medical departments of other industries. Each industry has its particular medical problems and requirements. Further, the geographical situation of the industry in relation to outside medical assistance will also dictate the medical services that must be available within the factory.

In Chatham Dockyard mass X ray facilities are available in the adjacent naval establishment of H.M.S. *Pembroke* and these are fully utilized for the benefit of dockyard employees

The designated accident hospital for the Medway towns is within 1½ miles of the medical centre

Transport for patients presents no difficulties. A fully equipped accident ambulance stands by at the medical centre 24 hours a day for emergencies and is not sent outside the dockyard. A second ambulance stands by in working hours for transport of patients to home and to hospital. At least one other ambulance is always available at the dockyard garage

In view of the proximity of the hospital facilities and the ready availability of ambulances it was considered unnecessary to have specially equipped recovery rooms

SUMMARY

The conversion of an existing building into a new medical centre in a Royal dockyard is described together with details of accommodation and equipment provided

ACKNOWLEDGMENTS

I am grateful to Rear Admiral I. W. T. Beloe *D.S.C.* Admiral Superintendent H.M. Dockyard Chatham for permission to publish this article to Miss V. C. Davis Senior Photographer for the photographs and to Mr. R. A. Phipps Draughtsman for the plan

MAN-INDUCED HYPERPYREXIA

By Surgeon Commander T A TURNBULL, R N (Retired)

HEATSTROKE has since time immemorial caused much morbidity and [illegible] fatality amongst civil and military populations In recent years considerable research has been undertaken to elucidate the causes of heatstroke and to evaluate suggested methods of prophylaxis and treatment

The majority of cases of heatstroke are considered to be due to a disturbance of the heat regulating mechanisms of the body when subjected to conditions of extreme heat and humidity Man's efficiency is influenced by the warmth of his environment Exposure to high air temperatures with stagnant air can lead to heat exhaustion and heatstroke the more so when there is also a high humidity Acclimatization and the wearing of suitable clothing can reduce very considerably the incidence of heat exhaustion and heatstroke When the air temperature exceeds 90°F acclimatized and suitably dressed personnel can tolerate a threshold wet-bulb temperature 4 to 10°F higher than unacclimatized and untrained personnel especially those wearing heavy and poorly permeable clothing The risk is greater when hard work or long treks have to be undertaken However there are also reports in the literature of cases of heatstroke being induced by the administration of drugs when the environmental temperatures were excessive It was because of these reports that the possibility of inducing heatstroke had to be considered when planning a clinical trial to assess a new anti-emetic drug against the hitherto standard treatment with hyoscine hydrobromide As a part of this trial was to take place in the Indian Ocean during the monsoon it was particularly important to take cognizance of the work of Horne (1954) He reported on a patient with a history of a previous anhidrotic heat exhaustion who a year later developed a post operative hyperpyrexia when atropine had been included in the pre operative medication Horne described a series of experiments in which he claimed that patients who had a history of anhidrotic heat exhaustion were as a result more susceptible to atropine not only immediately after clinical recovery but also up to a year later He states "It was not possible to discover whether the sensitivity to atropine was a direct result of having had anhidrotic heat exhaustion or whether it was due to some constitutional abnormality of the structure function or even number of sweat glands which would also make the subject more susceptible to the syndrome

Litman (1952a) had also previously drawn attention to the possibility that certain patients with a tendency to anhidrosis in hot weather were more liable to a rise in body temperature after being given anti-cholinergic drugs than those patients with normal sweat mechanisms He had selected 19 male ambulatory patients suffering from Parkinson's disease and repeatedly subjected them to heat according to the

method of List and Peet (1938). During these heat tests the patients were either given no medication or else one of the following drugs

1 Artane (an anti-spasmodic)
2 Benadryl (an anti-histamine)
3 Rabellon (mixture of belladonna alkaloids)

He found that four patients known to have either a mild or severe idiopathic hypohidrosis had a drastic reduction of sweating frequently associated with a marked hyperthermic response to the heat test when given either Artane Benadryl or Rabellon which was not seen in the remaining 15 patients who had a normal sweat mechanism

The problems of avoiding hyperpyrexia and heat exhaustion depend largely on the control of evaporation of sweat and the correction of fluid and salt balance of the blood It is with the problem of sweat evaporation and drug therapy that we are concerned in this review In this era of universal and rapid travel the problem of man induced heatstroke must be considered especially as Ladell, Waterlow and Hudson (1944) Edholm (1963) and others have pointed out as it is the lack of adequate acclimatization that is often the major factor in producing heat exhaustion and heatstroke Let us not add to this danger by the misuse of certain drugs which can interfere with the central and peripheral heat regulating mechanisms

Ladell *et al* (1944) have described two forms of heat exhaustion one occurring in the early part of the hot weather period when collapse is associated with sweating and the other in the second half of the summer where the collapse is associated with defective sweating and "prickly heat This "prickly heat is of the type described by O Brien (1960) as miliaria profunda

The fulnre of the body to lose heat by sweating results from three main causes Firstly the sweat may be produced but fails to be evaporated as may be seen in operating theatres and over clothed personnel Secondly the sweat is not produced either because of some inherent failure in the sweat gland mechanism or interference by drugs with anti cholinergic actions and thirdly the efficiency of the sweat gland is impaired by miliaria profunda (prickly heat)

Sweat may be produced but not evaporated if the temperature of the air is high and it is saturated with water vapour These conditions are often encountered in operating theatres and several cases of heatstroke have occurred in these circumstances Gibson (1900) referred to a number of cases of post operative heatstroke and considered the cause to be due to excessive coverings and towelling Wilcox (1920) stressed the advantages of minimal coverings for surgical operating in the Middle East Cutting (1931) and Everitt and Witham (1937) reported cases of heatstroke following surgical procedures during heat waves in the United States and discussed the problems of theatre clothing towelling and theatre conditions in relation to heat loss Protective measures were suggested. Harris and Hinton (1956), reporting three cases of surgical heatstroke in London, stressed the importance of minimal coverings to permit of adequate heat loss by radiation and evaporation of water In some of these patients atropine may have been a contributing factor and this problem is discussed later

The evaporation [illegible] is very much reduced when the body is [illegible] completely immersed in hot water as only the sweat from the eccrine glands of the head is available for evaporation and this will be limited by moisture in the air above the bath Marchand (1958) reported a case of hyperpyrexia in a patient given a thermal bath (T 96 F) for the treatment of syphilis of the central nervous system The patient developed an acute renal insufficiency although subsequently he recovered Wright (1940) has also recorded deaths due to heat exhaustion following thermal baths when the temperature of the water remained at 98 F or above for a prolonged time These cases were associated with disease and it is well known that heat exhaustion is more likely to occur where there is disease of the central nervous system or in the very young or very old

Defective sweating occurs when there is a failure of either the central or peripheral mechanisms It can also occur when there is 'fatigue' of sweat glands for which there may be no pathological explanation Here it is convenient to include the anhidrosis of miliaria profunda which is associated with the blockage of sweat glands rather than diminished production of sweat (O'Brien 1960) Congenital absence of sweat glands is not unknown and MacQuaide (1944) reports two non fatal cases of heat exhaustion in men of the Royal Air Force serving in the Middle East

Most cases of drug-induced heatstroke reported are associated with the belladonna or similar synthetic alkaloids and occasionally with anti-histamine, antispasmodic or tranquillizing drugs The majority of these cases are either associated with atropine pre-anæsthesia medication or with the treatment of chronic encephalitis with belladonna Love (1919) reported a case of heatstroke (in Mesopotamia) after atropine gr $\frac{1}{100}$ was given as pre operative medication This danger of using atropine as premedication in hot climates was also stressed by Wilcox (1920) Duncan (1935) discussed five fatal cases of heatstroke following operation of whom three had been given atropine as a part of the premedication He drew attention to excess heat in operating theatres and advised minimal towelling and care in the use of pre operative atropine He also advised restricting pre- and post operative fluids as little as possible Genauer (1946) reported two cases of heatstroke following surgery and advised reducing the pre-operative administration of anti cholinergic drugs (such as atropine or scopolamine) in hot weather as they inhibit sweating Bigler and McQuiston (1951) reported two deaths, occurring in very young children due to post operative hyperthermia in the summer months In subsequent experimental investigations they were unable to show that atropine in normal doses produced a raised temperature under temperate climatic conditions Chapman and Bean (1956) discussed a fatal case of heatstroke following bronchoscopy performed during a heat wave in Iowa This patient first had a biopsy for removal of a supra clavicular gland and on the following day a bronchoscopy was performed under general anæsthesia with atropine 0 2 mg as part of the premedication Fluid intake had been restricted for several hours before each operation on both days The authors consider that the atropine, the reduced fluid intake on two successive days and the towelling were all contributory causes to the death of the patient

Belladonna and its alkaloids have been used considerably in the treatment of

post-encephalitic Parkinsonism. Hall (1937) drew attention to the possibility of hyperpyrexia developing in chronic encephalitic patients treated with belladonna. He reported on three patients receiving 33·5 mg. belladonna daily who developed high temperatures during an exceptionally hot spell. They recovered after treatment with tepid sponging. Cooper (1936) had previously reported on a fatal case of heat stroke developing in a similar patient on a daily dose of 12 mg. of Tinct. Stramonium. This patient suffered from heatstroke after sitting in the sun on a particularly hot day for only an hour. Segerdahl (1934) had a similar fatality with a patient receiving 39 mg. atropine daily. On this occasion the patient had been seated in the open but not in direct sunlight. Jewett, Kosow and Prumpian Midlin (1938) reported that during a particularly hot period. Practically all our atropine patients developed very high temperatures accompanied by rapid pulse and hot dry skin. A few developed confusion and delirium. In all there was complete lack of disagreeable subjective symptoms. The treatment was not interrupted. In this group the average dose was 24 mg. daily with a maximum of 52·5 mg. and a minimum of 7·5 mg. Price and Merritt (1941) reported a non-fatal case of heatstroke during treatment with an unspecified quantity of "Wine of Bulgarian Belladonna". Litman (1952*b*) reporting three fatal cases of heatstroke among chronic encephalitic patients being treated with belladonna, draws attention to the fact that two of these patients had marked postural hypotension presumably due to the action of atropine on an already diseased autonomic system. All three showed marked disturbances of autonomic function before the onset of hyperpyrexia.

In 1957 during a prolonged hot weather spell in New York seven out of 23 severely ill mental patients being treated with Pecazine in high dosage (300 to 400 mg. daily) developed heatstroke. Ext (1958) reporting these cases, draws attention to the fact that phenothiazines have an atropine like effect which may lead to disturbances of heat control especially in the mentally ill.

Heatstroke has been reported by Drew (1944) in a soldier treated with belladonna for a peptic ulcer whilst he was serving in India. Atropine fever has been described in children when given high dosages of belladonna. Bettecken and Moll (1961) have reported three infants developing hyperpyrexia and signs of atropine poisoning following treatment of colic with Be Te (3-tropanol tropine benzilate) in the absence of abnormal environmental conditions.

A number of cases of hyperpyrexia and heat exhaustion are reported in the literature that do not fall exactly into the two groups reviewed above. Attention is drawn to these reports as the hyperpyrexia that may occur in certain diseases under certain conditions may possibly progress to heat exhaustion or heatstroke under adverse climatic conditions.

Certain diseases can carry an increased post operative risk of hyperpyrexia or heatstroke. Silverman and Wilson (1950) reported a case of heatstroke with residual cerebellar damage occurring after a thyroidectomy for thyrotoxicosis undertaken during a hot spell. Tornblom (1961) has reported a case of fatal idiopathic hyperthermia following the removal of an islet cell tumour and discusses six other similar cases reported in the literature.

Luby, Domino and Arbor (1961) and Baldridge, Miller, Haverback and Brunjes

(1962) have drawn attention to the fact that overdosage with monoamine oxidase inhibitors may cause severe hyperpyrexia and in their two reported cases there was an associated hyperhidrosis. The reasons for this hyperpyrexia are not fully understood but it is considered that it may be due to the M.A.O. inhibition of adrenaline breakdown.

Many instances are reported in the literature of heatstroke following the intravenous use of vaccines for acute and chronic conditions. Hartman (1937) reported a fatal case of heatstroke occurring after the last of 14 injections of autogeneous vaccine and tuberculin for bilateral iridocyclitis. Autopsy showed pathological changes similar to those found with acute anoxia. Hartman suggests that is essential to treat the anoxia that is usually present in heatstroke with oxygen therapy. Malamud, Haymaker and Curten (1948) in their review of 125 fatal cases of heatstroke are not in complete accord with this view. Whittet (1960) has recently considered the problem of pyrogens and fever and their effect on heat control.

Two fatal cases of febrile reactions following the infusion of human albumin solution to cirrhotics, are reported by Dykes (1962). He draws attention to Degowin and Hardin's (1940) investigation of non-fatal febrile reactions following intravenous therapy. They found the incidence was 0·7 per cent in over 12 000 saline and dextrose infusions and 2·7 per cent following approximately 2 000 blood transfusions. Their tables show the incidence of febrile reactions to be considerably higher during the summer months in a ten month period in 1939/40. Knippis, Palmer and Glukman (1961) have reviewed the literature which draws attention to the thermogenic properties of certain steroids producing steroid fever.

The evidence from this review of the literature of iatrogenic hyperpyrexia and heatstroke suggests that under certain circumstances the prescribing of drugs with anti-cholinergic properties may well be the final factor in precipitating heatstroke. The probability is that this factor is likely to be limited to the very young to the very old and to those who have some serious illness especially associated with the central nervous system. It is therefore of importance to regulate the prescription of the anti-cholinergic, anti-histamine and phenothiazine drugs to the very young and to the very elderly who travel or reside in hot climates. As unacclimatized troops moving rapidly into hot weather conditions are known to fall victim to heatstroke and this risk may well be aggravated when undertaking hard work or wearing protective clothing, the provision of anti-emetic drugs for military personnel under active service conditions in hot climates should not be indiscriminate. Although the risk is small the problems discussed by Morton (1952) and Litman (1952) must be borne in mind.

Miles (1954) reported a series of experiments on the influence of atropine sulfate on acclimatization in hot regions. He concluded that "In a warm moist climate the injection of 2 mg. atropine does not produce any diminution of general efficiency and presents no great hazard. In a hot dry climate there is considerable circulatory disturbance. The risk is not primarily one of hyperpyrexia but of added stress leading to a circulatory collapse. At the same time there is considerable distress which is due to cerebral irritation. In the fully acclimatized man this risk of circulatory breakdown is very much lessened. In the unacclimatized man collapse would be almost certain."

The difficulty of prophylactic and therapeutic prescribing in hot climates is manifold. Stein (1963) has recently shown in rats that atropine and hyoscine acting centrally inhibit both eating and drinking, whereas their quaternary analogues atropine methyl nitrate and hyoscine methyl nitrate acting peripherally inhibit eating only. He concludes in the abstract of the article, 'Anti cholinergic drugs evidently block drinking by a central effect and eating by a peripheral effect'.

Shibolet, Fisher, Gilat, Bank and Heller (1962) report three cases of fatal heat-stroke following strenuous exercise in hot weather in men of the Israel Defence Force. There were multiple haemorrhages in all organs and there was an increased fibrinolysis and fibrinogenemia in three cases. This report draws attention to the fact that these findings may be seen in shock, hyperthermia liver damage, tissue damage, physical effort and with the administration of adrenergic drugs.

In compiling this review the following sources were checked:

Index Medicus	1960–62
Current List of Medical Literature	1951–59
Quarterly Cumulative Index Medicus	1931–50

Relevant references were checked back to 1900, but it is probable that a number have been omitted. It is hoped that the references given will be of value to those who may wish to study the problem further. I am indebted to Miss C. Tiedman and Miss M. Massey-Stewart, B.A., who so kindly assisted in searching references.

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THERMAL COMFORT IN A SMALL WARSHIP

An account of an investigation conducted in H.M.A.S. *Quickmatch*

By Surgeon Lieutenant D. A. NOBLE, R.A.N.

INTRODUCTION

Purpose of the Enquiry

The principal objective of the investigation described in this report was to determine the desirable and the upper-acceptable levels of thermal comfort for Australian naval ratings at rest on the mess decks or engaged in sedentary activities in a small warship of the Royal Australian Navy at sea in hot climates.

Reasons for the Enquiry

During the Second World War the loss of efficiency due to excessive warmth between decks in ships serving in tropical waters was the cause of grave concern to all the belligerents. It may become of even greater significance in the future now that a type of warfare is envisaged which may require the maintenance of closed down conditions for long periods of time.

Perhaps for these reasons there has been in recent years an increasing tendency towards the air conditioning of living spaces in ships. At the same time however, there has also been a marked increase in the amount of offensive and defensive equipment which has to be accommodated leaving only minimal space for the provision of air-conditioning machinery.

It has, therefore, become of considerable importance that accurate information on the desirable level of warmth to be achieved, and the upper level of warmth which can be accepted without serious loss of efficiency should be available to ship constructors for design purposes.

The level of thermal comfort in naval vessels has been the subject of a number of previous enquiries. Notable among these were those of Ellis who determined with considerable care (Ellis 1952, 1953) the upper levels of thermal comfort on the mess decks for acclimatized men of the Royal Navy serving in tropical waters.

Despite the availability of these findings it was nevertheless thought desirable to undertake the present investigation if only to be certain—such is the importance of the matter—that they apply also in the Royal Australian Navy. It could well be that the previous climatic experience, manner of dress, or degree of acclimatization of the men concerned, or the type of ship and organization of ship board routine could materially influence the result.

METHODS

The Ship

The investigation was carried out in H M A S *Quickmatch* This ship of approximately 2 000 tons displacement was constructed in England during the last war as a "Q"-class destroyer It was later converted by the Royal Australian Navy into an anti-submarine frigate The investigation was carried out in an old ship and new construction differs considerably

The Voyage

The ship's movements between 18th November 1959 and 16th March 1960 during which time this investigation was carried out are set out in Table I It will be seen that the ship sailed from Melbourne west about Australia to Singapore and returned east about to Sydney

Table I

Movements of H M A S Quickmatch during the investigation

Port	Date (1959–1960) Arrive	Depart
Melbourne	—	18th November
Fremantle	24th November	26th November
Singapore	3rd December	17th December
Hong Kong	24th December	2nd January
Singapore	7th January	20th January
Penang	22nd January	25th January
Singapore	27th January	15th February
Trincomalee	20th February	22nd February
Singapore	27th February	1st March
Darwin	7th March	8th March
Cairns	12th March	13th March
Sydney	17th March	—

Observations

Environmental Measurements Measurements of environmental warmth were all made according to the methods recommended for the Royal Navy by Bedford (1946) Dry and wet bulb temperatures were measured with a sling psychrometer mean radiant temperatures were determined by the use of a globe thermometer and air speeds were measured with a high-temperature (130 125F) silvered Kata thermometer

Each of these measurements was made at a representative point on each of the mess decks, a position being chosen where conditions were not unduly influenced by the punka louvre ventilating system or by the proximity of open doors or hatches They were made on each occasion at the time of the mid day meal when the occupants of each compartment were seated at rest and on days when the ship was at sea cruising between ports The measurements were then immediately repeated on an open part of the upper deck

Comfort Votes At the same time as the measurements were being made on the mess decks "comfort vote" slips were distributed and completed by the occupants of that particular compartment.

On these slips the men were asked to record their sensations of thermal comfort on a seven point scale viz "much too cool", "too cool", "cool", "comfortable", "warm", "too warm" and "much too warm". In addition they were asked to record whether or not they were sweating and the clothes they were wearing at the time they recorded these sensations of comfort. This scale of comfort is derived from that of Bedford (1936, 1948), and the form of the vote was essentially that used by Ellis (1952).

Other Measurements Additional recordings made on each occasion but to which no reference will be made in this report included the sea temperature at the time of the observations and the ship's longitude and latitude.

RESULTS

Votes were collected from 150 petty officers and men. Some votes had to be discarded for a variety of reasons, but there remained 720 votes suitable for analysis, an average of 4·8 votes per man.

Environmental Conditions

Observations were not begun until 26th November, the first day out from Fremantle, but were made at intervals thereafter throughout the remainder of the voyage. The range of temperatures encountered on the mess decks is presented in Table II, together with the range of dry- and wet-bulb temperatures recorded on the upper deck.

Table II

Range of temperatures (°F) recorded on the mess decks and upper deck

	Dry bulb temperature	Wet bulb temperature	Corrected E.T. (Normal)	Corrected E.T. (Basic)
Mess decks	76·5–90·0	64·0–82·0	71·1–85·0	67·5–86·3
Upper deck	67·0–88·8	59·5–80·0		

The air movement on the mess decks varied from 18 to 186 feet per minute and was not related to the wind speed on the upper deck. It varied from place to place in the messes according to the proximity of the punka louvres, open hatches or scuttles.

As would be expected, the temperatures (both wet- and dry-bulb) prevailing on the mess decks were higher than those measured at the same time on the upper deck. The total heat content of the air on the upper deck was calculated and compared with the total heat content of the air on the mess decks. It was found that, despite some capricious variations, the total heat gain of the air on the mess decks was greater at lower than at higher air temperatures. When the wet-bulb temperature on the upper deck was below 70°F. the average total heat gain on the mess decks was 3·5 B.Th.U./lb. of dry air, but when the wet bulb temperature was above 70° F. the average gain was 2·5 B.Th.U./lb. of dry air. No consistent difference was observed between the several mess decks.

Distribution of Votes Cast

The number of votes cast in each category of thermal sensation is shown in Table III. It will be observed that only 115 votes or 16 per cent. of all votes cast are included in the categories "comfortable" or cooler" and the remainder (84 per cent) of the votes cast are included in the categories "warm" to "much too warm".

Table III

Number of votes recorded for each category of thermal sensation

Assessment	Number of votes cast
Much too warm	93
Too warm	214
Warm	298
Comfortable	90
Cool	23
Too cool	2
Much too cool	—
	720

The frequency distribution of all the votes cast in each category of thermal sensation with respect to dry bulb temperature is set out in Table IV and similar tables for "corrected" effective temperature (normal) and "corrected" effective temperature (basic) are given in Appendix I. The "corrected" scale of effective temperature includes in its assessment of environmental warmth the mean radiant temperature of the surroundings as well as air temperature, humidity and air movement.

Table IV

The frequency distribution of the votes cast in each category of thermal sensation with respect to air (dry-bulb) temperature

	Number of votes cast														
Air temp (°F)	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	Total
Much too warm	1	—	—	—	—	—	10	—	2	14	13	28	14	11		93
Too warm	5	—	—	3	2	6	—	18	—	5	43	32	58	24	18	214
Warm	12	2		21	15	9		35		23	47	14	66	41	13	298
Comfortable	4	8	9	12	5	6		9	—	7	11	8	8	2	1	90
Cool	1	6		12		1		1			2	—	—	—	—	23
Too cool	—	1	—	—	—	—	—	—		1	—	—	—	—	—	2
Much too cool	—	—	—	—	—	—										—
Total	23	17	9	49	22	22	—	73		37	117	67	160	81	43	720

Table IV shows that the votes are not uniformly distributed throughout the temperature range encountered but occur most frequently at the upper end of the range. Only 30 per cent of the total votes were cast between 76 F and 84 F. The remaining

70 per cent [illegible] 80 F Only two votes [illegible] too cool [illegible] its were cast in the category much too cool Table IV shows that there was the expected wide individual variation in the assessment of any particular environment the votes cast at any given temperature usually extend over at least four grades of thermal sensation

Assessment of Thermal Sensation

On account of the restricted range of environmental conditions encountered the thermal comfort zone could not be demonstrated by the usual methods It was therefore decided to determine average values for each of the thermal sensations experienced and the following method was adopted The seven points on the scale of thermal comfort used in the comfort votes were given numerical values on an arbitrary scale ranging from 1 for 'much too cool' to 7 for 'much too warm' The mid-point ('comfortable') had therefore a numerical value of 4

Each vote cast was assigned its appropriate numerical value and the mean value of all the votes cast on each occasion that each condition was encountered was determined The results are set out in Figure 1 in which the average thermal assessment on each occasion is plotted against the prevailing dry-bulb temperature basic "corrected" effective temperature and normal "corrected" effective temperature In each case the appropriate regression line has been calculated assuming that a linear relation exists between the two variables concerned In practice this linear relationship has been found to hold although it cannot be justified on theoretical grounds

Dry bulb Temperature The relation between the sensation of thermal comfort experienced and the dry bulb temperature for men clad only in shorts is shown in Figure 1A The corresponding regression equation was found to be

$$Y = 86\,3 \quad 3\,82\,(x - 5\,35)$$

where x is the average of the thermal sensations in units on the arbitrary scale and is the dry bulb temperature in degrees Fahrenheit This indicates that, for members of the ship's crew clad only in shorts the average sensation would be 'comfortable' when the dry bulb temperature was 81 F Some would of course consider this temperature too warm and others consider it too cool but the average vote would be comfortable and it may be considered the desirable level of warmth

If it is permissible to extend the acceptable level of warmth to include "warm" (5 on the scale) then the upper acceptable limit for the average man at rest and clad only in shorts will be 85 F At any one time however not all the men even on the mess decks will be wearing only shorts Engine room staff coming on and off watch for example will be wearing overalls in addition To obtain an average picture which embraces all men the relation between dry bulb temperature and thermal sensation has been calculated for all votes cast irrespective of clothing The results are shown in Figure 1B and the regression equation is

$$Y = 85\,36 - 4\,93\,(x \quad 5\,34)$$

where t is the dry bulb temperature and x is the thermal sensation The average sensation is that of comfort therefore when the air temperature is 79°F and if the comfort zone is extended to include those who are warm but not too warm the upper limit becomes 84°F

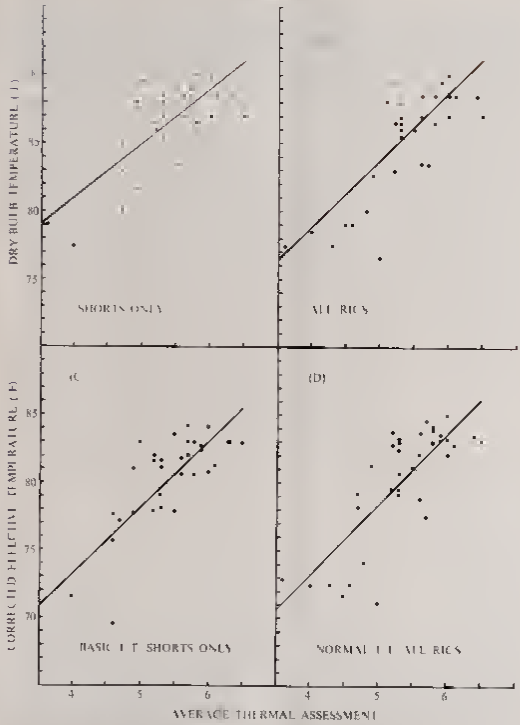


Fig. 1. The relation between the average thermal assessment on an arbitrary scale from 1 (much too cool) to 7 (much too warm) and (a) the thermal conditions existing on each occasion for (A) men clad in shorts only and (b) dry-bulb temperature; (B) men in all rigs and dry-bulb temperature (C) men in shorts only and basic "corrected" effective temperature and (D) men in all rigs and normal "corrected" effective temperature

Effective Temperature The results for men clad only in shorts were also examined in terms of the Basic Effective Temperature Scale The results are plotted in Figure 1C

The corresponding regression equation is

$$Y = 80\,08 + 5\,09\,(x - 5\,35)$$

where x is the thermal sensation and t the corrected basic effective temperature This indicates that the average vote will be "comfortable" when the basic effective temperature is 73 F and the upper limit of comfort (if this includes those who are 'warm' is 78 F

When the results for all men irrespective of dress were examinad using the Normal Effective Temperature Scale (Figure 1D) the corresponding regression equation was

$$Y = 80\,16 + 5\,16\,(x - 5\,34)$$

where x is the thermal sensation and t the corrected effective temperature (normal) The results indicate that an average vote of "comfortable" will occur at 73 F and the average vote will not exceed the value for 'warm' up to 78°F on the Normal Corrected Effective Temperature Scale

Summary of Findings The findings with respect to dry bulb temperature and effective temperature both for "shorts only" and "all rigs" are summarized in Table V

Table V

The desirable ('comfortable') and acceptable levels of warmth ('warm') for men clad only in shorts and for the population as a whole (all rigs)

		Shorts only		All rigs	
		Dry bulb (Ft)	Basic C E T (F)	Dry-bulb (F)	Normal C E.T (F)
Comfortable	(4)	81	73	79	73
Warm	(5)	85	78	84	78

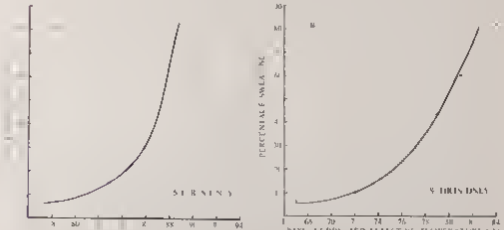


Fig. 2. The relation between the percentage occurrence of overt sweating on men clad only in shorts and (A) dry bulb temperature and (B) basic corrected effective temperature

Onset of Sweating

It has been remarked on a number of occasions that the onset of thermal discomfort is closely associated with the appearance of unevaporated sweat upon the skin It was for this reason that men were asked to indicate on their comfort votes whether or not they were sweating When the percentage of men clad only in shorts who were sweating was plotted against dry bulb temperature and against basic corrected effective temperature the results shown in Figure 2 and Table VI were obtained

Table VI

Relation of the incidence of overt sweating to environmental temperature expressed as the percentage of those exposed to the condition

Dry bulb temperature (°F)	Percentage sweating	Corrected E T (Basic) (°F)	Percentage sweating
77	0	67	6 3
78	0	68	—
79	6 3	69	0
80	10 0	70	—
81	38 1	71	0
82	—	72	10 0
83	12-5	73	—
84	—	74	—
85	7 5	75	36 4
86	53 8	76	
87	75 4	77	23 4
88	61 2	78	28 0
89	63 3	79	43-5
90	80 6	80	78-1
91	—	81	60 4
92	—	82	61 5
93	—	83	66 3
94	—	84	81 0

They are consistent with the hypothesis that a sharp and continuing increase in the number of men sweating occurred above a dry-bulb temperature of 85°F and above 78°F on the Basic Corrected Effective Temperature Scale

Clothing

Other factors besides thermal comfort determine the amount of clothing worn on the mess decks Nevertheless the discarding of all clothing until the minimum of "shorts only" is reached provides a valuable index of the point of onset of thermal discomfort It is of interest, therefore that at 73 F effective temperature (basic) only some 10 per cent of the men were clad in shorts only but at 78°F effective temperature (basic) approximately 90 per cent of the men were so dressed

DISCUSSION

Heat Gain on Mess Decks

It has been shown (Grav and Smith 1952) that for a given rate of ventilation the difference between the total heat content of the air in a ship's compartment and the total heat of the outside air was independent of the external conditions It was not surprising however to find that in the present instance the gain in total heat varied with upper-deck temperature Such variation with external conditions would be expected if the ventilation varied with the environmental conditions That is if with the occurrence of warmer weather more hatches were kept open or more wind-scoops set in the scuttles Whether scuttles were opened or not was however often determined by the probable entry of sea water and this might account for at least some of the capricious variation in heat gain observed

However it would appear that there was at most times a considerable entry of fresh unheated air as the average heat gain 3 5-2 5 B Th U /lb was low In a ship of similar size steaming in the English Channel in autumn a value of 4 7 B Th U /lb was obtained (Darlow Hempleman Macpherson Pepler and Smith 1956) and in a cruiser off Singapore a total heat increment of 6 7 B Th U lb was observed between the external air and a typical mess deck (Ellis John Macpherson and Newling 1951)

Degree of Acclimatization

The acceptable level of warmth will vary with the degree of acclimatization of those exposed H M A S *Quickmatch* left Australia during the summer months and a proportion of the ship's company had been on leave in Queensland before sailing It is probable then that the men as a whole possessed a considerable degree of acclimatization to heat before the ship sailed

It is usually accepted that the greater part of the immediate physiological adjustments to heat occur within the first two weeks of exposure The investigation on H M A S *Quickmatch* was not begun until the ship left Fremantle and by far the greater part of the votes were cast after the ship had been two weeks in tropical waters It may therefore be concluded that the degree of acclimatization represented by these findings was very similar to that possessed by the men investigated by Ellis (1952) That is to say that they possessed to the full the degree of natural acclimatization of men serving in ships in tropical waters

Findings in the Royal Navy

The results of the present investigation accord remarkably well with those of Ellis (1952) for men of the Royal Navy which were based on two very extensive enquiries concerning the thermal comfort of acclimatized men serving in tropical waters The agreement is the more striking as his conclusions were arrived at in a very different manner Using two criteria viz that more than 80 per cent of persons feel reasonably comfortable and less than 20 per cent observe the presence of unevaporated sweat on their skin his conclusions was as follows According to the two criteria suggested above the upper acceptable levels of warmth determined from a total of 5 211 replies examined in both experiments were an effective temperature of 79 F for comfort and 78 F for sweating He therefore recommends that

designers should limit to keep the temperature on the mess decks below an effective temperature of 78 1 to ensure reasonable comfort He found that the upper level of the optimum or ideal zone of comfort when equal numbers of persons reported that they were either cool or warm occurred at 74 F effective temperature

CONCLUSIONS

The findings just described indicate that when the air temperature is 81°F or the basic corrected effective temperature is 73°F it is to be expected that men clad only in shorts and seated at rest will on the average feel quite comfortable This may, therefore be described as the desirable level of warmth When however the air temperature exceeds 85 F or the basic corrected effective temperature 78 F an acceptable feeling of warmth will on the average give place to discomfort It is suggested therefore that this constitutes the upper acceptable level of warmth

It is emphasized that this level of warmth although described as acceptable is nevertheless undesirably high At this level as can be seen from Table IV and Table 1A of Appendix 1 a considerable proportion of those exposed will find the conditions too warm and the most heat-sensitive men will suffer discomfort It is considered that the conditions selected as the target for design purposes should be the desirable level of warmth

These conclusions apply only to men stripped to the waist and seated at rest If the amount of clothing is increased or the rate of energy expenditure rises or the degree of acclimatization to warmth is less then the point at which thermal comfort will be achieved will be lower It is significant in this regard to point out (Hindmarsh and Macpherson 1962) that the preferred dry bulb temperature for office workers in Sydney clad in their usual indoor clothing is 73 F

All the men on the mess decks will not be clad in shorts and some provision must be made for those such as engineering mechanics going on or coming off watch who of necessity rather than choice are more heavily clad It is suggested that an appropriate allowance based on the findings for all rigs in the present enquiry would be made if the desirable level of warmth was considered to be 79 F dry-bulb temperature or 73°F normal corrected effective temperature and the upper acceptable level of warmth 84°F dry bulb temperature or 78 F normal corrected effective temperature

It is perhaps unnecessary to add that the findings with respect to dry bulb temperature apply only when the air movement humidity and mean radiant temperature approximate to those occurring in the present investigation It is likely however that these variables would have similar values in other living spaces even in other ships at corresponding air temperatures

SUMMARY

1 An investigation was undertaken to determine the desirable and upper acceptable levels of warmth for Australian naval ratings at rest or engaged in sedentary activities in ships serving in tropical waters

2 The desirable level of warmth, defined as that level which the average of all opinions would assess as comfortable was found to be 81°F dry bulb temperature or 73°F basic "corrected" effective temperature

3 The upper acceptable level of warmth defined as that level which the average of all opinions would assess as warm was represented by 85°F dry bulb temperature or 78°F basic "corrected" effective temperature

4 These findings apply only to men clad only in shorts resting or engaged in sedentary occupations who are naturally acclimatized to tropical conditions

5 Because some men on the mess decks will of necessity be wearing more than shorts alone it is suggested that the desirable level of warmth be considered to be 79 F dry bulb temperature or 73 F normal "corrected" effective temperature and the upper acceptable limits 84°F dry-bulb temperature or 78 F normal "corrected" effective temperature

6 The results are in very good agreement with those of a similar but much larger investigation made in a ship of the Royal Navy serving in tropical waters

ACKNOWLEDGMENTS

This paper is published with the permission of the Medical Director General Surgeon Rear Admiral L. Lockwood whose interest and encouragement are gratefully acknowledged It is a pleasant duty to acknowledge also the help received from the Captain (Commander B L Cleary) and officers of H M A S *Quickmatch* S B P O A E Hume assisted in the collection of the data and S B A J Anderson in the analysis of the results The work was done under the direction of Dr R K Macpherson of the Environmental Health Section School of Public Health and Tropical Medicine University of Sydney

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Appendix I

Table 1A

The frequency distribution of the votes cast in each category of thermal sensation with respect to corrected effective temperature (normal)

		Number of votes cast															
CET (Normal) (°F)		71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	Total
Much too warm	(7)	1	—	—	1	—	—	3	7	4	—	6	15	40	10	6	93
Too warm	(6)	7	2		2	—	—	7	11	18	6	15	44	69	22	11	214
Warm	(5)	18	17	—	15	—	—	9	26	44	16	17	30	72	30	4	298
Comfortable	(4)	9	24	—	5	—	—	—	9	11	—	8	12	11	—	1	90
Cool	(3)	11	6	—	—	—	—	1	1	2	—	1	1	—	—	—	23
Too cool	(2)	1	1	—	—	—		—	—	—	—	—	—	—		—	2
Much too cool	(1)	—	—	—		—	—	—	—	—	—	—	—	—	—	—	—
Total		47	50	—	23	—	—	20	54	79	22	47	102	192	62	32	720

Table 2A

The frequency distribution of the votes cast in each category of thermal sensation with respect to corrected effective temperature (basic)

		Number of votes cast																
CET (Basic) (°F)		67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	Total
Much too warm	(7)	—	—	1	—	—	—	—	—	3	—	5	7	—	5	15	21	25	11	93
Too warm	(6)	1	—	7		1	2	—	—	7	—	14	15	6	16	58	31	38	18	214
Warm	(5)	6	—	25	—	4	15	—	—	9	—	44	26	16	8	49	48	32	16	298
Comfortable	(4)	6		18	—	9	5	—	—	—	—	18	2	—	2	23	3	3	1	90
Cool	(3)	10	—	3	—	6	—		—	—	—	1	1	—		2	—	—	—	23
Too cool	(2)	1	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	2
Much too cool	(1)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total		24	—	54	—	21	22	—	—	19	—	82	51	22	31	147	103	98	46	720

THE R.N. AUDIOMETRIC TRAILER UNIT

By Surgeon Lieutenant-Commander R R A COLES, R.N.,
Lieutenant A A HERON, R N (Retired), and Doctor J J KNIGHT

Introduction

Accounts have already been given in the JOURNAL of studies concerned with the auditory effects of jet aircraft noise (Knight 1963) and with small arms noise (Coles 1963). These are but two of a series of similar investigations which have been conducted since 1957 as part of the research programme of the Wernher Research Unit on Deafness carried out on behalf of the Royal Naval Personnel Research Committee. Detailed descriptions of the findings are contained in R N P R C reports and subsequently it is intended to make the results of the noise studies more generally available by publication in the specialist journals. One common factor in the programme was the employment of the R N Audiometric Trailer Unit for practically all the clinical examinations and hearing tests at many different naval centres in the U K. The advantage was that the tests were thus conducted everywhere under uniform conditions. Although originally conceived (by A A, H.) as a mobile unit for the routine hearing tests used in selection of men specializing in submarine detection, the unit has proved invaluable in these and other investigations of hearing in occupational noise.

Interest in the effects of noise on hearing is currently expressed by many authorities and other mobile facilities of similar type will be necessary for tests of hearing in the industrial field. It is for this reason that the present account* of the naval unit has been prepared in order that the details of its basic design and performance might serve perhaps as a basis for modification to suit individual requirements of others. Whilst two of the authors (R R A C. and J J K.) association with the unit has been only that of users, it has been suggested that this successful naval enterprise (costing more than £7 250 in 1955) should be documented and acknowledgment given to those who assisted in its design, construction and testing.

Facilities Provided

A photograph of the 23 ft. by 7 ft. 6 in. trailer unit is given as Figure 1. Within the sound-insulated caravan, mounted on a Hands trailer, are a fully equipped clinical examination space, a sound-insulated test chamber for audiometry and a waiting space. An internal view of the audiometric equipment and the test chamber in use, is shown as Figure 2.

*Accounts of other British mobile units serving similar functions have been given by the following authors: Dickson and Wheeler (1953); Pennington (1958); and Lee, John and Fowweather (1963).



Fig. 1. [illegible]

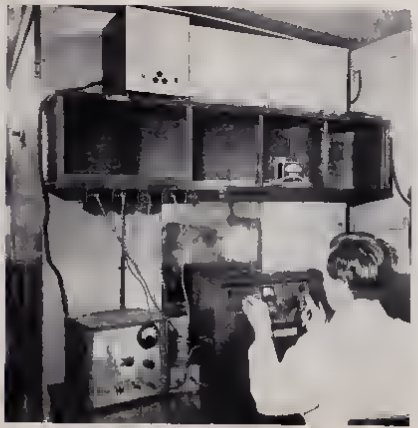


Fig. 2. [illegible]

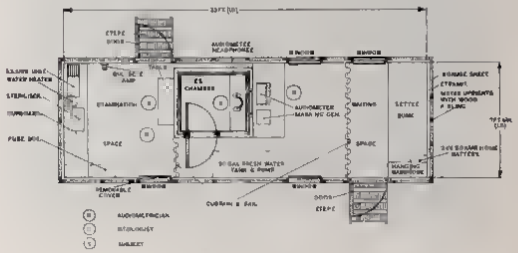


Fig 3 Plan of audiometric trailer unit

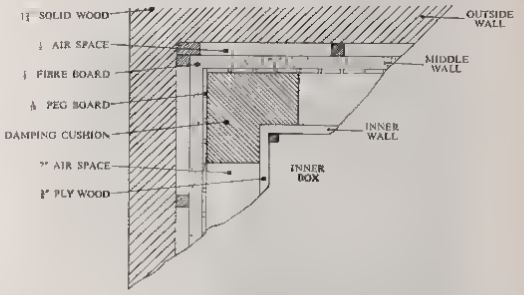


Fig 4 Plan showing construction of test chamber

For tests at ship-borne personnel the unit is normally towed into a sheltered position at the dockside parked and connected to a convenient 230 volts A C supply by means of a heavy duty cable carried on an externally fitted cable drum A 100 ft of 3 core T R S 14/0 18 in cable (rated to carry up to 57 amps) is provided although the usual load is only about 10 kilowatts (44 amps) An earthing spike is used to earth the chassis and apparatus

Permanently incorporated in the trailer are a large water tank (supplying sink taps and Sodia water heater in the examination space) wall heaters extractor fans emergency power supplies derived from a 24-volt battery for lighting and apparatus with emergency cooking equipment and convertible sleeping accommodation in the waiting space

Normally a naval Mark IV audiometer is installed for hearing acuity and pitch discrimination tests of unit submarine men However in the series of audiometric surveys previously mentioned an Amplivox Model 61 audiometer has been used In the examination space a stainless steel sink unit carries a sterilizer and the usual instruments for clinical examination of the ears nose and throat Thus the unit provides a completely self-contained base for audiometric surveys and similar routine investigations

Construction

A plan of the trailer unit is given in Figure 3 The complete body of the vehicle was designed to give an attenuation of 20 to 30 dB in the audible frequency range This was achieved by adoption of a double wall construction with sound absorptive material in the space between the walls The outer skin of the walls is of 18 gauge steel secured to a steel and wooden frame with hardboard on the inside A 2-in layer of Stramit a compressed strawboard was included in the space between the steel sheet and the hardboard so as to both obstruct and absorb sound A reasonably high mass per unit area of wall was thereby achieved for the necessary attenuation the resultant thickness of the composite wall being 2½ in Roof and floor are of similar construction with addition of a layer of wood to each for extra strength A ribbed rubber covering is used over the entire floor to reduce tread noise

Heavy double doors with refrigerator handles are fitted to the outer and inner walls of the test chamber the double-wall construction of which is illustrated in Figure 4 An observation window is also fitted with double glazing to maintain the acoustic insulation The test chamber is supported on four bearers with Metolastik Cushyfoot mounting locations bolts and straps are provided for preventing relative movement of the whole test chamber during transport During audiometric examinations the doors and windows of the vehicle are closed and the windows and ventilators fitted with massive internal covers to reduce sound transmission

The unladen weight of the unit is 8 tons 9 cwt It was built by Elliotts of Reading and the electrical installation was carried out by Avis and Baggs of the same town

Sound Attenuation

The attenuation of the trailer was measured in 1956 with pure tones generated externally by a loudspeaker The sound pressure level was measured at points outside

(80-95 dB re. 0·0002 dynes/cm²) and inside the vehicle, and the attenuation of the outer walls deduced. Because of the high degree of attenuation obtained in the construction of the test chamber it proved difficult to measure the sound level inside it when using the available 12-in. loudspeaker source external to the trailer. It was therefore necessary to bring the source inside the trailer to measure the attenuation of the test chamber separately.

The two sets of values of attenuation so obtained are given in Table I.

Table I
Attenuation by Vehicle Walls and of Test Chamber

Frequency (kc/s)	Attenuation (dB)	
	Outside/Inside	Inside/Test Chamber
0·1	22	32
0·2	21	38
0·5	38	55
1·0	39	47
2·0	41	54
3·0	51	59
4·0	60	60
5·0	40	59
6·0	48	51

However, on account of the unavoidable coupling which exists between the test chamber and the main structure of the trailer, the figure obtained for the attenuation at any frequency by adding the two components from Table I yields too optimistic a value for the sound attenuation from outside the trailer to within the test chamber.

It is the attenuation for the lower frequencies which is the important factor that limits reliable audiometry (Webster, 1954; and Cox, 1955) and, for example, at 200 c/s the effect of the trailer walls would probably not add more than about 10 dB to the 38 dB attenuation of the test chamber alone.

A measure of the overall insulation can be judged from the following readings taken on a site employed during one of the surveys in 1960. The trailer unit was parked in a sheltered region where the ambient noise level averaged 79 dB (C scale) with a spectrum predominating in the low frequencies. There, with all the doors closed, the noise level within the test chamber averaged 45 dB (C scale). The noise levels were determined with a General Radio Sound Level Meter, Type 759B, calibrated by the National Physical Laboratory.

More recently further measurements have been made when the trailer was deliberately situated near a noisy diesel engine. The sound field 3 ft. away from the side of the trailer then reached a level of 97 dB overall, with maximum components in the

octave-band centred on 250 c/s. Inside the booth the engine was clearly audible and the overall sound pressure level was found to be 60 dB. However, analysis of its frequency spectrum there showed that most of the noise was restricted to frequencies below 91 c.s. ("low-pass" setting). In the octave-band centred on 250 c/s the level registered was only 40 dB, while in higher octaves it fell below the 30 dB lower limit of the apparatus used. Thus throughout the 250-8 000 c/s range of test frequencies the sound pressure level within the booth in spite of this intense external sound field satisfied the criterion defined by Webster and Cox for measurement of the air conduction threshold of hearing (to the American Standard, 1951). For measurement to the British Standard the criterion quoted should be lowered by about 10 dB: even then, with the 97 dB external field, the noise within the booth would still be low enough for accurate audiometric measurements from 500 c.s. upwards. A Dawe Sound Level Meter Type 1400-E and Octave-Band Filter Type 1464-A were used on this instance.

In practice, subjects with normal hearing undergoing the audiometric test can be just aware of conversational levels of speech in the examination space. Some of the louder (but generally intermittent) dockyard noises and the sound of aircraft flying over can also be detected at times. However, by taking reasonable care to use low levels of speech and by avoiding threshold determination during any interruption of the usual quiet background, the unit is eminently suitable for air-conduction tests on normal subjects down to 250 c/s. This has been proved by the measurements of average hearing levels corresponding to British Standard, B.S. 2497 (1954) at frequencies as low as 250 c/s with different groups on a number of occasions.

Possible Improvements

Air conditioning is not provided in the test chamber and it is customary to use a small fan to change the air after each subject has been tested. In summer, when the trailer has been in direct sunlight, the temperature in the test chamber has often exceeded 90°F. The roof of the trailer has now been repainted with a reflecting paint in order to keep the trailer at a lower temperature when exposed to such conditions, and installation of air conditioning is being considered.

If, for some future requirement, such as the determination of normal bone-conduction thresholds, low ambient noise levels are required in the test chamber, conditions could be improved by adopting an inner wall of much heavier construction in place of the existing shell. A satisfactory alternative would be to replace the present test chamber by one of the better sound-insulated booths which have recently become commercially available.

In spite of the massive form of the vehicle, it sways in a strong wind and whenever anyone moves in the trailer. The motion is accentuated for the subject in the test chamber and causes a distinct disturbance of the test routine. Movement of the trailer could be eliminated by supporting the four corners on suitable blocks.

During the last year a certain amount of trouble has resulted from condensation in the Stramit. Use of a more modern non-water absorbent material would now be advised; indeed, the lower panels of strawboard in the walls of the vehicle have recently been replaced by ones of asbestos and glassfibre.

Applications

In the past eight years the unit has been in almost continuous use both for routine audiometric tests and as an E N T consulting room. It has been employed in several R N P R C projects including the investigation of possible long term effects on hearing of repeated otitic barotrauma and of the noise of aircraft diesel engines small-arms and guided missiles. It has also been lent for an investigation of industrial deafness and has been used in hearing conservation programmes.

Recently the unit has been part of the Royal Naval Medical School's demonstration, at the 1963 Royal Society of Health Exhibition of the active interest of the medical branch in 'The Problem of Noise'.

ACKNOWLEDGMENTS

We wish to give acknowledgment to Surgeon Commanders G S Irvine and L G H LeClercq, R N., who contributed greatly to the design and supervision of the vehicle's construction while they were successive Senior Medical Officers at H M S *Osprey*. We are also grateful to Surgeon Captain R T May R N for his interest in keeping the unit well maintained and in making it available to us when required.

Our thanks are due to Professor W Burns Chairman of the Hearing Sub-Committee of the R N P R C and Doctor T S Littler, Director of the Warnher Research Unit on Deafness for their advice and supervision during six audiometric surveys during which the trailer unit has amply proved its worth.

The attenuation measurements made at Admiralty Research Laboratory are given by permission of the Superintendent.

We also wish to express our gratitude to the two previous Medical Directors General of the Navy for sponsoring the surveys and to the present Director-General for permission to publish this paper.

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AGEING IN THE ROYAL NAVY

By Surgeon Lieutenant-Commander W B. WRIGHT, R N

PART IV—CHAPTER IV

'For an old man he is old
For an old man he is grey' (Old Song)

Discussion and Conclusions

It will be recalled that the purpose of this investigation was to explore the current impression that ratings looked older than their years This seemed worth while whether premature degeneracy among these men proved genuine or spurious and the group seemed recognizable as an entity worthy of such separate investigation

We now have a collection of evidence which includes a very good reason why ratings might look older than men of similar age (i e premature greying at the temples) but gives no other indication of precipitate senescence

Life expectancy is obviously the ultimate index of ageing and it must be remembered that the ratings under examination at present have nothing to do with those whose mortality rates were charted at the pensions department However the present life expectancy study provides fairly strong evidence that a naval life *per se* is not detrimental to longevity It might be argued that the last war might have provided a factor additional to basic naval conditions which was conducive to degenerative change but this is somewhat beside the point of the present enquiry which is concerned with the possible influences of a whole way of life In any case since the average rating who died in 1959 retired in 1927 aged 40 most of these ratings must have taken part in the First World War The influence of war on longevity should therefore have touched them as much as the present group It is interesting to note that grey hair one of the signs of ageing most striking to the casual observer and taken by some as synonymous with long experience and wisdom is also one of the few ageing phenomena (and the only one in the present group) which can be reproduced in the young by a variety of agents other than senescence Thus "Extreme psychotic or psychoneurotic states or cerebral trauma may predispose to rapid or premature greying—also heredity emotional strain endocrine disturbances dietary deficiency and chronic disease" (Barahal 1940)

If grey-headedness stands out this way from the other indices it would seem reasonable to assume that its cause should be sought along other lines than senescence, and that the other signs offer more dependable evidence of ageing for comparison purposes

Why then are ratings grey headed so early? At first [illegible] would seem most likely and the result spurious. Against this is the fact that I had no knowledge even of the trend of results when the investigation was in progress, and had no previous figures to bias me in any direction. The incidence of Campbell de Morgan's spots, arcus senilis and the range of accommodation were all measured at the same time yet none of these results show any such bias. Range of accommodation was more liable to be misinterpreted yet this showed as close accord with civilian figures as the others.

Another source of error might be the unknown incidence of hair-dyeing in the communities studied. This would certainly have been a considerable difficulty had women been the subject of study but surely not in men? In any case the smooth upward curves obtained do not suggest interference by such an outside agency. It seems likely that the difference is genuine.

Though there is definite evidence of other causes of premature greyness such as X-radiation (Marshall 1952) and thyrotoxicosis (Simpson 1956) the bulk of evidence supports nutritional deficiency as the main cause at any rate in animals (Frost 1948).

Many deficiencies have been shown to be potentially responsible, such as protein (Hartwell 1923)—especially certain amino acids e.g. lysine (Vohra and Kratzer, 1956) copper (Keil and Nelson 1931) zinc (Stirn *et al*, 1935) and vitamins of the B Complex group (Free 1940) particularly pantothenic acid and P aminobenzoic acid (Martin, 1941). Frost (1948) pointed out that pantothenic acid deficiency showed first with greying of animals far more severe deficiency went on to impaired growth and adrenal deficiency.

Nutritional deficiency has been seen as a cause of grey hair in children (Frost 1948) and an adult case in association with malnutrition and a nephritic illness was recorded by Ferrabone *et al* (1956) in which normal colour was regained four months after appropriate treatment.

A borderline B Complex deficiency can by certain factors be so precipitated that grey hair occurs much earlier. Ralli *et al* (1941) showed that a low salt intake could do this in animals. Similarly, it was found by Martin (1942) that rats went grey if sulphonamides were added to the diet. An excess of nicotinic acid and pyridoxin was found to produce a similar effect.

As Frost said "More than one factor would probably be involved in any human deficiency. While frank Vitamin B Complex deficiency is most unlikely to have occurred undetected among naval ratings even during the war it is not inconceivable that borderline deficit might have existed from time to time in the Navy or among any other group. Granting this possibility there may be factors associated with naval life capable of accentuating such a tendency sufficiently for the phenomenon of premature greying to make itself evident with the passage of time.

The precipitating effect of alcohol on peripheral neuritis due to Vitamin B deficiency is worth recollecting here (Macgrath 1956). From my own experience ratings tend to eat less at sea (sub-clinical mal de-mer?) and their midday meal is preceded by an eighth of a pint of rum—a calorie source which might well supplant some of the

dietary supply To this might at times be added the intense heat below decks in the tropics as a cause of anorexia and salt deficiency as well

There is undoubtedly a high incidence of venereal disease in the Navy among sea going crews and in addition one of the commonest causes of sick-bay attendance on board ship is diarrhœa—most particularly on arrival at any unfamiliar tropical port Names such as "Hong Kong dog", "Malta dog" etc. are very familiar within the Navy In the treatment of both these common conditions the sulphonamide drugs have been heavily relied on If analogy may be drawn from animal experiments some of these points might be worthy of further investigation in relation to premature grey headedness in the Navy

Turning to the other aspects of ageing which have been explored it is evident that these indices are worthless in isolation as an index of individual senescence Thus though Campbell de Morgan's spots may appear with steadily increasing frequency, they might occur at any age in the individual The same applies to arcus senilis at least over 25 years When a man's range of accommodation falls to 5 dioptres or less (i e when he is about ready for reading glasses) he is normally 40 to 45 but the scatter gram shows such cases from the age of 32

Supposing the ruby spots and arcus senilis are taken together as one composite sign and only those who show both are considered, the incidence becomes much more age selective (see Table XII)

Table XII

Composite incidence of arcus senilis and Campbell de Morgan's spots

Age	Total	Both signs present	% incidence
25–	105	0	0
30	79	4	5
35–	72	3	4
40–45	76	16	21

It is quite evident that the combination of these signs is rare under 40 with a rapid increase in incidence thereafter

If to these signs we add a range of accommodation of 5 dioptres or less, the resultant index is even more selective yet the sharp rise in incidence over 40 is unchanged (Table XIII)

Table XIII

Composite incidence of all three signs in ratings

Age	Total	Three signs present	% incidence
25	91*	0	0
30–	64	0	0
35	63	2†	3
40–45	65	14	15

*These totals are not the same as in the previous table, because some ratings were rejected for range of accommodation testing because of incidental refractive errors

†Both of these cases occurred at age 39

Taking the further step of assessing the incidence of any one, any two, and all three signs, the results are as follows

Table XIV

Composite Index Table

Age	Total	Any one	Any two	All three
25	91	14 (15%)	0 (0%)	0 (0%)
30–	64	23 (36%)	4 (6%)	0 (0%)
35	63	39 (62%)	10 (16%)	2 (3%)
40–45	64	60 (92%)	37 (57%)	10 (15%)

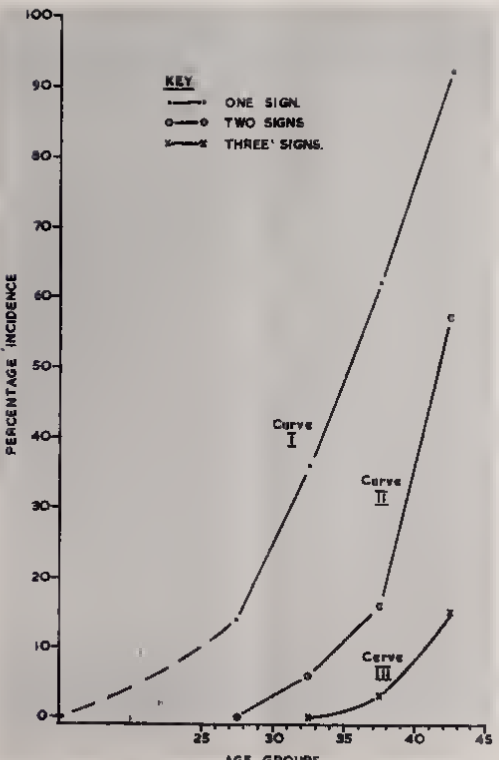
These results are represented in graphic form in Figure VI

If we now bring the results to bear on observation of the individual, certain fairly emphatic inferences can be drawn, viz

1 If a rating has any one sign, he could be any age but is probably over 25 (certainly if the first costal cartilages are calcified)

2 If the rating has any two signs, he can hardly be less than 35—he is certainly over 30

3 If all three signs are present he is over 40 (especially if costal cartilages other than the first are also calcified)


KEY
ONE SIGN.
TWO SIGNS
THREE SIGNS.
PERCENTAGE INCIDENCE
AGE GROUPS
Curve I
Curve II
Curve III
100
90
80
70
60
50
40
30
20
10
0
25
30
35
40
45

It should be noted that only two out of 218 men less than 40 had all three signs and both were 39

It would appear that there is here a useful diagnostic tool for the assessment of age if not of ageing by which a man could be measured

Certainly if a man developed all these signs at an age much younger than noted here, he would appear to be abnormal, because this does not normally occur If the use of this tool had been called for in his case because of an appearance of premature ageing, such a result would go far towards confirming the impression provided that his date of birth was not in doubt

In relation to group comparison study all that has been established among these ratings is a blue print pattern of the development of signs associated with ageing (each of which is fairly consistent with the others) It may be that this pattern is universal If however two groups whose occupational standard mortality rates were different (such as administrators and transport workers) were compared with regard to the age incidence of such a composite index as has been described (Curve III Figure VI) and it was found that those with the heavier over all mortality also developed this composite of signs sooner then some weight could be given to the assumption that this occupation was linked with accelerated ageing With these thoughts in mind it has been considered worthwhile making this work available for perusal by anyone interested in the subject

ACKNOWLEDGMENTS

I wish to thank Dr J N Morris M R C Unit of Social Medicine for his assistance that this enterprise could be worthwhile

I wish to thank Surgeon Captain J L S Coulter R N Retired and Surgeon Captain S Miles for their advice and encouragement

My thanks are also due to Mr C Manfield of the Department of Naval Pensions for allowing me to go through his files

I am grateful to those officers and ratings of the barracks at Chatham and Portsmouth, who co operated with me in my field studies

Thanks also to Mr Peter Thursfield for helping me with my statistics

My thanks also go to Miss Russell of the Royal Naval Hospital Haslar who typed my notes and to Miss Trinboy of the Royal Naval Physiological Laboratory, who made the graphic reproductions

My very sincere thanks also to Surgeon Captain Eric Bradbury for his interest and help on the radiological side of the project, and to the Medical Director-General of the Navy for permission to submit this thesis

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DOUBLE-SIDED BATH FOR CONTRAST BATHING

By Surgeon Captain H E B CURTEL, R N



Contrast bathing is one of the simplest and most efficient forms of physiotherapy available to the general practitioner It is not always easy to do it effectively using vessels which are available in the ordinary sick bay or home A basin while it will contain the foot in comfort has too shallow a depth of water and the large surface area encourages cooling of the hot water A bucket, while providing adequate depth is not wide enough at the bottom to contain the average foot in comfort If the patient is bored and uncomfortable he will probably cut short his recommended period of treatment

For many years I have used and been very satisfied with a double-sided bath The design is very simple It is made of thin galvanized iron and is very nearly the shape of a cube (12 12 13 in) Two compartments separated by a double bulkhead are provided each 6 × 12 12 in These accommodate a foot comfortably and provide a good depth of water The double bulkhead encompasses an air space 1 in across Thus is a refinement which gives insulation between the hot and cold sides The use of a single bulkhead would make the construction price cheaper

The bath can be made quite cheaply by any working tinsmith In England in a country town the price is about £2 10s. while in Malaya it is about $15 Malayan

THE RHYTHM OF VENEREAL INFECTION IN A SHIP'S COMPANY

By Surgeon Lieutenant J. A. SAVIN R.N.

Go to now ye rich men weep and howl for your miseries that shall come upon you
JAMES V 1

A TRANSIENT gleam of optimism induced by the introduction of antibiotics and typified by the statement (Hutchison 1961) that venereal diseases among seafarers 'are clearly on the wane' was rapidly doused by a multiplicity of reports showing that the incidence of these diseases was in fact, rising. Promiscuity is thought to be more widespread and respect for these diseases to be less than formerly (Wilcox, 1962). A sharp increase of venereal disease particularly gonorrhœa has been noted among adolescents (British Co-operative Clinical Group, 1962) and this appears to have been coincident with and perhaps linked to raised relative affluence of this group.

The object of the present study is to assess the importance of finance upon the acquisition of venereal disease in a ship's company, and for this purpose observations were made of the behaviour of a ship's company in the Far East for a period of 14 months.

Method

As each fresh case of venereal disease was assessed the rating concerned was asked to give the date of the act or acts of intercourse which he held responsible for the acquisition of the disease: these dates were recorded. Since ship's company payment was on alternate Thursdays throughout the commission it is possible to plot the stage of the pay-cycle at which each of these copulations occurred. The results were integrated and are shown in a single diagram (Figure 1) representing the incidence of 'blamed' copulations throughout the pay-cycle.

An analysis of the detailed punishment returns was represented in the same way. Figure 2 shows the incidence of

A Total punished offences.

B Caught in known brothel offences.

C Returned on board drunk offences.

Figure 3 shows the incidence of fresh cases of venereal disease presenting at the sick bay and Figure 4 shows the incidence of all fresh cases presenting at the sick bay.

Results

Considering each figure in turn

Figure 1. Forty-five ratings were involved contracting 68 fresh cases of venereal disease; they blamed 89 dated copulations for this. The incidence of these copulations can be seen to decline markedly but irregularly during the course of the pay-cycle. The general level of intercourse was highest during the first five days and then declined steadily with a minor peak during the weekend.

Figure 2A. Of the total offences punished 70 per cent were being absent without leave. The usual explanations for failure to return in the morning involved both drink and sex. The decline is again interrupted by a minor peak for the second weekend.

B. Assuming a constant vigilance of the shore patrols throughout the pay-cycle, the high incidence of offenders "caught in known brothels" on pay-night itself is very striking. The incidence does not remain high for five days (as does the incidence of "blamed" copulations) but falls rapidly to zero. Perhaps the ratings who acquire venereal disease spin out their money by using cheaper and possibly for this reason more infectious prostitutes; perhaps their greater experience acquaints them better with the beat of the patrols. It has not been possible to prove these points.

C. Offences involving drunkenness show a slower rise than do the other groups of offences described. The incidence reaches a peak two days after pay-day and thereafter declines, though less steeply than the other groups, with a slight peak after the second weekend.

Figure 3. The interval between pay-day and the peak for presentation of fresh cases at the sick bay is four to five days. This is, of course, of the same order of magnitude as the incubation period of gonorrhœa, the commonest of the venereal diseases. A similar pause can be seen after the second weekend.

Figure 4. The low rate for presentation of fresh cases on Sunday can be explained simply in terms of leave which temporarily reduces the population of the ship. With this exception the incidence remains fairly constant. No significant difference can be seen between the two weeks.

Further Investigations

In the period under consideration 45 (38 per cent) of the European ratings acquired one or more venereal infections. This group of infected ratings was considered in relation to the causation of punished offences, and was found to be responsible for roughly three-quarters of these (Table I).

Phrased differently, 38 per cent of ratings were responsible for nearly 75 per cent of all offences. From these figures it can be calculated (Table II) that infected ratings are more than four times as prone to commit these offences as those who do not catch venereal disease. This association is statistically highly significant. These figures represent the activities of a hard core of ratings who are both sexual and social offenders.

Interpretation of results

It is convenient that payment was made fortnightly rather than weekly. The blank or non-payment week can be used as a control. For example, if payment was

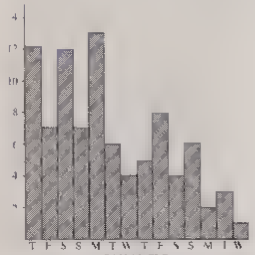


Fig. 1. Blam... hospitalisations

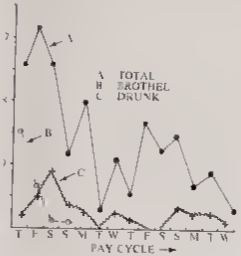


Fig. 2. Offences

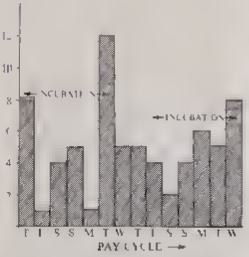


Fig. 3. Presentation of V.D.

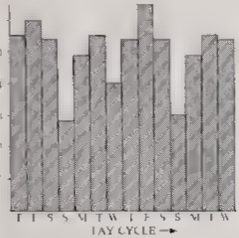


Fig. 4. All cases

made weekly and venereal disease was shown to be contracted maximally at the weekends it would be hard to differentiate between the effect of the weekend itself and the effect of the immediately preceding payment In this study both can be seen to affect promiscuity and anti-social behaviour The occasional payment at sea probably blurs the sharpness of the effect of pay-day

Table 1

Offence	"Drunk	"In brothel	"Leave-breaking	Total
No of offences	29	24	110	163
No committed by "infected ratings	22	18	77	117
"committed by infected" ratings	76	75	70	72

Table 2

Offence	"Drunk	In brothel	Leave-breaking"	Total
Average No of offences per "infected rating	0 49	0 4	1 71	2 6
Per non-infected" rating	0 093	0 08	0·44	0·61
Ratio	5·24	5 0	3·88	4 24

The results shown in Figures 1 and 2 when considered together lit the theory that with the decline in affluence after pay-day the more expensive vices are discarded first The expensive and alcoholic night in the brothel on pay-night is spoiled for some by the heavy hand of the patrol is followed for others by a distressingly late return to the ship the next morning and is ruined for the unlucky few by the onset of symptoms a few days later During the succeeding nights few are able to afford the luxury of a long stay at the brothel and fewer are captured there They have to remain content with short visits and solace themselves with drink More return on board drunk at

night but fewer return late in the morning. Beer is cheap and drunkenness is scattered throughout the pay-cycle.

The mild flare-up of activity during the second weekend may represent a conditioned pattern of behaviour related to the more widespread weekly pay packet. This may be learned from previous jobs or from the behaviour of civilian parents and friends. More probably, however, it is simply related to the proportion of the time available for these activities.

Discussion

Another example of rhythmically recurring criminal tendencies has been shown in the case of the menstrual cycle (Dalton, 1961), significantly more crimes are committed by women during the premenstruum and menstruation itself than would be expected by chance. Probably few factors are shared by the menstrual and the pay-cycles. Water retention may be common to premenstrual tension and to the rapid drinking of beer; this may have an effect in producing abnormal behaviour. An obvious difference is that the pay-cycle affects a group of people synchronously whilst menstruation does not.

My impression is that the "sheep" instinct is important in the pay-cycle. Sailors prefer to do the same things at the same time and to follow an active leader.

It would be administratively simple to pay one twelfth of the ship's company on each weekday. This could be done alphabetically to split up established groups. A leader would find it hard on any particular day to recruit a flock sufficiently rich to follow him to the more expensive vices.

There are many other ways of minimizing the effect of the pay cycle. For example stoppage of leave is a fairly common punishment for the offences mentioned earlier. It is usual to stop leave from the date of award of the punishment; it would be equally easy to stop leave as from the date of the next pay day. In this way some of the hard core of offenders would be removed from their roles as leaders of the herd in the post pay day revels. It would probably be unacceptable judicially to punish offences committed in the first few days of the pay cycle more heavily than the others.

Propaganda campaigns both moral and medical could be geared to the rhythm of the pay cycle for practical purposes however, these methods are of very limited value in the presence of a synchronous pay cycle it is unlikely that acceptable counter attractions can be provided and probably the most important step is the provision of an adequate supply of condoms especially in the early stages of the cycle.

Summary

A relationship between the pay-cycle, the acquisition of venereal disease, and the commission of certain types of offence has been demonstrated in a ship's company.

Suggestions are made for the deliberate disruption of the pattern, and in particular asynchronous payment is recommended.

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Clinical Case

REMOVAL OF A BROKEN KUNTSCHNER NAIL

By Surgeon Lieutenant-Commander K. T. HESKETH
Department of Orthopaedic Surgery, R.N. Hospital, Haslar

After intramedullary fixation of a fracture of the femur with a Kuntschner nail it is possible for the nail itself to break.

A young man was treated for malunion of a fractured femur by nailing and Phemister graft. He was known to have taken weight against advice some few weeks later and this produced slight bowing of the femur and nail at the level of injury. Subsequently the nail fractured transversely at this point. He presented with acute pain and loss of knee flexion which had previously been good. As union was not complete it was thought desirable to replace the nail if this could be done without a major procedure and further interference at the operation site.



Fig. 1. Radiograph showing the broken nail in situ.



Fig. 2. Actual photograph of the tip of the extractor.

The upper end of the nail was exposed in the buttock and cleared of scar tissue and callus. The "core" was removed by drilling out the upper end; the drill passed through about an inch of callus before finding a free passage.

The extracting implement passed easily down the inside of the nail and with manœuvring the hook engaged the lower end. An ordinary Kuntschner nail extractor could then be used to ease the proximal fragment about half an inch. A "mole" wrench was then fastened to the special instrument and both fragments were rail roaded out by gentle hammering. A replacement nail was put in.

Following operation pain was relieved and knee movement began to return at once. Weight bearing was allowed shortly with crutches and union proceeded.

ACKNOWLEDGMENTS

I wish to thank Mr. W. A. Laxen of the London Splint Company for his help in producing the extractor. The photographs are by courtesy of the Royal Portsmouth Hospital. The permission of the Medical Director General of the Royal Navy to publish is also acknowledged.

Reviews

A Primer of Medicine By M H Pappworth M D M R C P Second Edition Pp 279 Index London Butterworth & Co Price 32s 6d

This first edition of this book has already been reviewed in this Journal and the appearance of this edition after a short interval of three years in addition to three reprints is sufficient indication of the great success of its predecessor In this volume the author has made over five hundred relatively short but often important alterations and brought the subject matter completely up to date There are purposely few additions but three new sections on hypertension on pulmonale and the urinary supply of the bladder This has led to a further 13 pages of content but fortunately no increase in the price of the book

For the clinicians who do not know the format of this book it must be emphasized that it was never meant to be rather a comprehensive textbook of medicine nor a complete account of all symptoms and physical signs in clinical medicine The latter is unfortunate In so far as it cannot be expected in this connection with the more well known and established books on the subject which are used by all medical students On the other hand it is well known that Dr Pappworth has turned his book on his known and tutorials for the M R C P course and on this account it is packed with valuable material Both undergraduates and postgraduates will find it of inestimable value particularly when revising for examinations In view of the clarity of the essential basic facts enumerated mostly about the correct elimination and interpretation of physical signs in the mind (but not all) basic systems of clinical medicine As such the book can be highly recommended L G T

Bristol Diagnosis By Charles Seward M D F R C P (Edin) Sixth Edition Pp xix 499 London and Edinburgh E & S Livingstone Ltd Price 30s 1s 3d postage

Unlike most other medical textbooks Bedside Diagnosis adopts the unusual approach of differential diagnosis of individual symptoms instead of grouping diseases on an anatomical basis At the beginning of each chapter a brief consideration of the relevant normal anatomy and physiology helps to explain how a given symptom may arise The emphasis is thus laid upon clinical observation and examination rather than on laboratory diagnostic aids

A most helpful feature is the summary of clinical signs given before each chapter

This book may perhaps find its most appreciative readers among those preparing for examinations J J B

Clinical Cardiology By Velva Schrire M Sc Ph D M B (Cape Town) F R C P E F R C P Pp 331 illustrations London Staples Press Price 70s

Dr Schrire warns us at the start that this is not a standard reference textbook in cardiology yet he has provided us up-to-date and detailed review of heart disease with a bibliography of the most recent literature To accomplish this task in 331 pages in his mode the stylistic brief almost note form and with the intelligent use of the many illustrations there is room for an astonishing amount of information

This book is certainly written for those who understand the meaning of P A F V S D P D A F and P C G without much further explanation There is also the current attachment to eponyms such as the Windkessel effect (page 26) and Shosh n ben ban (page 140) and while one can permit Fallot s tetralogy (page 177) Fallot certainly did not have a trilogy (page 178) or pentalogy (page 182) however convenient the name may be

Electrocardiography is well described but it is said that standard lead three in deep inspiration does not appear to warrant an illustration Congenital heart disease is given due importance in the light of modern techniques although it is interesting that Marfan s Syndrome is associated with aortic lesions rather than with aneurysm septal defect Medical treatment is given a special chapter at the end of the book entailing repeated references to Chapter 19 but would be helpful if the specific page was given rather than next in the next edition In order to save the reader from thumbing through a chapter of 22 pages This type of cross reference evidently gave the author some anxiety the electrocardiogram of the effects of quinidine is on page 100 the description of the effects of this drug on page 107 and its therapeutic use is described on page 347

These criticisms are not intended to deprecate this book and they are only made in the hope that future additions will attend to these minor points If anyone would like to understand the modern physiological approach to cardiology Dr Schrire has provided the opportunity J M C

Disease in Infancy and Childhood By Richard W B Ellis O B E M A M D F R C P Fourth Edition Pp vi – 717 with 300 plates and illustrations Edinburgh and London E & S Livingstone Ltd Price 60s 1 2s 6d home postage

This remarkable book has now reached its fourth edition within 12 years and the reason for its success is only too clear It is one of the new generation of medical textbooks which are readable and yet valuable as reference books profusely and excellently illustrated and produced to the usual high standards of E & S Livingstone

Professor Ellis holds the chair of Child Life and Health at Edinburgh and the chairs of Social and Environmental Factors in Disease emphasises his interest in the Public Health aspect of paediatrics while the encyclopaedic nature of his description of disease will give any physician the information he requires This book is a must for all who have the medical care of children

J M C

LOCAL ANALGESIA. By Clive Jolly M B B S M R C S., L.R.C.P D A F F A R C S Pp viii 112 Fifteen illustrations London H K Lewis & Co Ltd Price 15s

This small volume gives a general outline of the methods that may be used to produce local analgesia but falls short of good anatomical diagrams which are essential for study practice The coverage of the local anaesthetics is adequate but the account of Vasopressors is too brief The reader who intends using local analgesia frequently would be well advised to seek greater detail of the methods and nomenclatures in the larger textbooks available

This book however has the advantage that the reader can bring himself up to date with the basis of local analgesia in a few hours as what is written is clear and concise.

K L M M

ADVANCES IN CARDIOPULMONARY DISEASES Volume I Edited by Andrew L Banyai M D F C C P and Burgess L Gordon M D F C C P First Edition Pp 359 Illustrated Year Book Medical Publishers, Inc Chicago Distributed in the United Kingdom by Lloyd Luke (Medical Books) Ltd. London Price 83s

This book contains 18 lectures as delivered in the 1961 series of postgraduate courses presented by the Committee on Postgraduate Medical Education of the American College of Chest Physicians It is a most credible collection of papers with the subject matter ranging from the clinical problems of the respiratory distress syndrome in the newborn the management of emphysema, traumatic heart disease dissecting aneurysm of the aorta and diaphragmatic hernias to physiological discussions on oxygen transport in the lung and the measurement of alveolar ventilation dead space and the composition of alveolar gas At the end of each lecture there is an up-to-date predominantly American bibliography

This book bridges the gap between the outcome of modern research and the practising physician or surgeon in many of its chapters but there is much new information of interest to others; there is an excellent lecture on air pollution and its effects on the cardiovascular and respiratory systems, another on the occupational cancers of the respiratory tract and the newer pulmonary diseases of industry are also discussed.

This is a stimulating well illustrated and superbly produced book there can be few who would not enjoy its refreshing approach to one present clinical and physiological problems

J M C

OPERATIVE SURGERY REVISION By John J Shipman, M.S.(Lond) F R C.S (Eng.) Pp viii—172. London H K Lewis & Co Ltd PRICE 21s

This new book has been written to aid the candidate for the final part of the Fellowship in revising the essentials of Operative Surgery

In 166 pages the author has given in outline the essentials of 190 operations His choice of what to write and what to leave out must have been difficult and he has succeeded in including a great wealth of important Facts in synoptic form

This book may be found to be of value to those who like to have a synopsis to read through in the last few days before an examination Many will feel however that most of the facts given in this book should be known from experience by a fellowship candidate by the time he has reached the stage to his surgical training to present himself for examination

This book will be of considerable value to the candidate for final M B when the hints of operative surgery are usually too large and a small revision is invaluable

J R K

TEXTBOOK OF OPERATIVE SURGERY By Eric L Farquharson M D F R C S (Edin.) F R C S (Eng.) Second Edition Pp viii 548 Many coloured plates and black and white photographs Edinburgh and London E & S Livingstone Ltd. Price 25 6s 35s postage

The first edition of this book was published in 1954 and was enthusiastically received The second edition has now appeared The subject matter has been revised, alterations made and recent advances in technique incorporated Some 200 new illustrations have been included many of which are in colour all are well chosen and of a very high standard

This is a single author textbook of nearly a thousand pages It covers comprehensively the surgical anatomy operative technique and pre and post operative management of operations in common use and with less detail the more highly specialized procedures such as those on the heart and brain

In a single book it is not possible to include all the minutiae which might be found in a larger textbook but Mr Farquharson has achieved an admirable balance in his book To quote from the preface of the first edition he has presented the whole subject of operative surgery in balanced perspective from the viewpoint of the general surgeon in training

This book is wholeheartedly recommended to all surgeons as a most valuable textbook for those in training and also for those who may be called upon from time to time to perform operations outwith their usual sphere

J R K

CLINICAL NEUROLOGY By Ismet S Wechsler M D Second Edition [illegible] London W B Saunders Company Ltd Price 8l

This is the latest edition of a well known American textbook of Neurology

It is very well produced the text is lucid and the clinical descriptions good the diagrams are clear and informative and there are interesting photographs of a few cases together with illustrations of pathological specimens and photomicrographs of brain and cord histopathology

An interesting introductory chapter describes the technique of neurological examination in general and also gives an account of some of the more specialized investigations

At the end of each chapter there is a good list of references to recent literature these are mostly to American work but this need not deter the reader in this country provided that he has access to reasonable reference facilities

In a book at this price perhaps one might hope for a fuller description of some of the less common neurological conditions such as might appear in a British book of comparable cost it retails at £4 4s in this country which is perhaps somewhat high for the average reader J J B

EMERGENCY IN MEDICAL PRACTICE By C Allan Birch M D F R C P Seventh Edition Pp xi 784 123 illustrations 13 in colour Edinburgh and London E & S Livingstone Ltd Price 30s 2s 6d postage

Birch is a post war arrival on the bookshelf and its popularity is shown by the appearance of this seventh edition only 15 years after the first The author has a team of 24 contributors drawn from almost every medical school in the United Kingdom but there is an atmosphere of cohesion which is unusual in such a joint work cross references between chapters being numerous and repetition conspicuously absent There has been extensive revision of the text and an excellent index cannot be faulted

This book contains more information on the treatment of medical emergencies than any other currently available in this country even down to the names and telephone numbers of doctors and hospitals providing vaccines sera etc the local use of respiratory units artificial kidney units regional blood transfusion centres and even a list of reference centres for hæmophiliacs With Birch at your elbow the modern treatment of medical emergencies is possible and there can be very few who can afford to be without this remarkable book J M C

FUNDAMENTALS OF RADIOBIOLOGY By J M Baeq and Peter Alexander Complete Revised Second Edition Pp xii 555 London and New York Pergamon Press Price 70s

As this book remains the only lucid and comprehensive exposition of the essential facts theories and hypotheses in the field of radiobiology it is perhaps unfortunate for the beginner that this edition is considerably fuller than the first However the expansion which is due to the addition of much interesting new material is only a reflection of the increase in knowledge in the time between publication of the two editions In this respect it will be especially useful to experienced workers catching up with the general situation outside their immediate fields

The enthusiasm which was evident in the first edition persists particularly when the authors are discussing their own interests and here one must become aware slightly of the bias towards personal opinion As a whole the book is somewhat unbalanced in favour of the chemical and biochemical aspects but this is not altogether a bad thing for these are perhaps the very heart of the matter

Although there are a few misprints and at times one is aware of rather inept translations into English these faults have little effect on the continuing impression that this book is a necessity to every student of radiobiology T L F

We acknowledge with thanks receipt of the following publications.

Annales Medicinæ Internæ Fenniæ Australian Journal of Experimental Biology and Medical Science Annali di Medicina Navale Annals of Tropical Medicine and Parasitology Australia and New Zealand Journal of Surgery British Journal of Surgery B S I News British Medical Journal Bulletin of the World Health Organization Brussels Medical Bulletin Cardiologia of the World Health Organization Publications Ceylon Journal of Medical Science Guy's Hospital Gazette International Review of the Army Navy and Air Force Medical Services Japanese Journal of Medicine Journal of the Royal Naval Scientific Service Journal of the Irish Medical Association Journal of the Royal Army Medical Corps Kurume Medical Journal Kumamoto Medical Journal La Medicina de Reserva Medical Surgical Journal Canada Medical Digest Middlesex Hospital Journal Military Medicine Mie Medical Journal Montreal Medical North Wing Proceedings of the Staff Meetings of the Mayo Clinic R A N Medical Newsletter Research and Reviews (Boston University School of Medicine) Revista de Medicina Aeronautica Snakes Ahoy St Thomas Hospital Gazette St Mary's Hospital Gazette Tropical Disease Bulletin The Fukuoka Journal of Experimental Medicine Ulster Medical Journal University of Birmingham Medical Chronicle Yokohama Medical Bulletin Yonsei Medical Journal

News of the Services

OBITUARIES

Frederick William WATKYN THOMAS M D F R C S died on 31st January 1963 at the age of 75

G S I writes—F W WATKYN THOMAS was educated at Tonbridge School Trinity College Cambridge and St Bartholomew's Hospital At Cambridge he was an Exhibitioner and held the Benn Levy Studentship whilst at Barts he won the Brackenbury and Holden Scholarships After qualifying in 1914 he served with the R A M C in France being demobilised in 1920 with the rank of Major

He obtained the F R C S in 1921 and shortly afterwards was appointed to the staff of the Central London Throat Nose and Ear Hospital Gray's Inn Road later to be amalgamated with Golden Square Hospital and became what is now the Royal National Throat Nose and Ear Hospital In 1933 he joined the staff of the Royal Ear Hospital—the E N T department of University College Hospital

During the late war he was in charge of a surgical division in the Emergency Medical Service in London and a captain of Fire Guard He was a Past President of the Section of Otology of the Royal Society of Medicine a Consulting Surgeon to the Ministry of Pensions and a member of the Council of the British Association of Otolaryngologists

He was a Civilian Consultant in Otolaryngology to the Royal Navy from 1948 until the time of his death and was a member of the Royal Naval Personnel Research Committee in which he took a very active interest and was also the naval representative on the Flying Personnel Research Committee of the Royal Air Force

He was joint author of a classic textbook of otology and later edited a textbook on *Disease of the Throat, Nose and Ear* published in 1953 for which he wrote the entire section on the ear He was also the author of a number of articles and papers

Watty as he was universally and affectionately nicknamed was a patient and most capable teacher and his teaching was always emphasized with examples from his own vast clinical experience not infrequently and often amusingly punctuated with comments on what old so and so did and such learning a famous forefather in E N T had said or written about a case His primary interest was the ear and his operations particularly on the labyrinth was held in very high regard not only in Britain but also in many other countries He was widely read both in English and several other languages He was essentially a most loyal and kindly man and an excellent host

He was held in high esteem by all and not least by those who had the privilege of serving as his House Surgeons Watty was a great man and a great character who will be greatly missed by us all

He is survived by his wife to whom we offer our sincere sympathy

Surgeon Commander Gerald Meade EASTMENT R N (Rtd.) died in April 1963 He was born on 1st April 1876

He qualified as M R C S (Eng.) L R C P (Lond.) in 1900 and entered the Royal Naval Medical Service on 20th February 1900 as a Surgeon and was promoted to Staff Surgeon on 26th February 1908 and to Surgeon Commander on 20th February 1916 He was placed on the Retired List at his own request on 27th November 1919

J R I O writes Gerald Meade Eastment retired from the Navy at the end of the First World War and lived for 45 years on the family estate at Drayton Court in Somerset

Here in beautiful surroundings he was much loved and respected a keen shot and expert dry fly fisherman—for I remember many days by the River Culm with my cousin in latter years—he knew every mood of the countryside intimately

We shall not see his like again the prototype is lost forever

Surgeon Commander (D) Andrew Allen GARDNER R N (Rtd.) died on 21st April 1963 He was born on 23rd October 1900

He qualified B D S University of Dublin in 1927 and entered the Royal Naval Medical Service on 11th April 1928 as a Surgeon Lieutenant (D) He was promoted to Surgeon Lieutenant Commander on 24th March 1934 and Surgeon Commander on 25th July 1940 On 31st December 1945 he was placed on the Retired List (medically unfit)

HONOURS AND AWARDS

Companion of the Bath

Surgeon Rear Admiral (D) Philip Stanley Turner Q H D S L D S

Commander of the Order of the British Empire

Surgeon Captain Iain Campbell Macdonald M D Ch B F R C P (Edin.) F R F P S R N

HIGHER QUALIFICATIONS

Surgeon Lieutenant Commander I M MacIntyre Primary F F A March 1963
Surgeon Lieutenant D F Mann D Obst R C O G March 1963
Surgeon Lieutenant M G Mann D A May 1963

CONSULTANT APPOINTMENTS

Surgeon Rear Admiral J M Holford *O B E* Q H P T R C P (Lond) Consultant in Medicine
Surgeon Commodore F W Baskerville *C B E* L M S S A Consultant in Aviation Medicine
Surgeon Captain S Miles M D M Sc D T M & H Consultant in Physiology
Surgeon Captain E D Caldwell M D Ch B L R F P S F R C P (Edin) Consultant in Medicine
Surgeon Captain E James M D F R C P (Edin) D P H D I H Consultant in Hygiene
Surgeon Captain N S Hepburn M B Ch B D P H D I H Consultant in Hygiene
Surgeon Captain C P Collins, *D S C* M D D P H Consultant in Hygiene
Surgeon Captain D F Gard M D M Ch F R A C S (Oph) D O M S Consultant in Ophthalmology
Surgeon Captain P K Fraser M D Ch B Consultant in Pathology
Surgeon Captain E H Murchison *O B E* M B Ch B Consultant in Surgery
Surgeon Captain H L Cleave *O B E* Q H S F R C S (Eng) Consultant in Surgery
Surgeon Captain P D Breen B A M B B Ch F R C S (Edin) Consultant in Surgery
Surgeon Captain E B Martin *O B E* M R C S L R C P Consultant in Aviation Medicine
Surgeon Captain I C Macdonald *C B E* M D Ch B F R C P (Edin) F R F P S G (M) Consultant in Medicine
Surgeon Captain F F Ellis *O B E* M D F R C P (Lond) Consultant in Medicine
Surgeon Captain (D) A MacDonald Watson *O B E* L D S Consultant in Dental Surgery

PROMOTIONS

To Surgeon Rear Admiral E D Caldwell M D Ch B L R F P S F R C P (Edin)
To Surgeon Commodore F W Baskerville *C B E* L M S S A
To Surgeon Lieutenant-Commander S G Thompson M B B S F R C S
To Surgeon Lieutenant Commander (D) G G Salmon B Ch D L D S

Provisional selections have been made for promotion to date 31st December 1963:

To Surgeon Captain P J O Mears M B Ch B M R C S L R C P D P H G S Irvine M B B S M R C S L R C P D L O P S Fulks M D B S D P H M R C S L R C P
To Surgeon Captain (D) J Hinnie *O B E* L D S
To Surgeon Commander (D) K R Needham L D S
To Surgeon Commander M C H Jackson M B B S, L M S S A D Obst R C O G P H Lovell M B B S D M R D T M M Conway L R C P & S B Waters M R C S L R C P D D D C McNutt, *M B E* M B Ch B F M Kinsman M R C S L R C P D A

NEW ENTRIES

Surgeon Lieutenant Commander P P M Brown M R C S L R C P D P H
Surgeon Lieutenants C J Quigley M B Ch C D H D Jones L M S S A R J Cole M B B S D Obst R C O G D A Miss C C Green M B Ch B D Obst R C O G
Surgeon Lieutenants (D) C F Morris, B D S L D S I N Garside L D S R C S (Eng.) M J Swann, B D S

RE ENTRIES

Surgeon Lieutenant Commanders J M Smith MacKay and R R Pearson

PRE-REGISTRATION ENTRIES

Surgeon Sub-Lieutenants D R Leitch D H L Dodds D I Wise J R Glennie, F E Willmott C M Rendall B D Kirkpatrick P M Coutts N E Heeley W D E Mullam D L Swain

TRANSFERRED TO THE PERMANENT LIST

Surgeon Lieutenant A G Watson M B Ch B
Surgeon Lieutenant (D) T J C Hall L D S

RETIREMENTS

Vice-Admiral Sir Robert Panekridge *K B E C B* Q H P 30 4 63
Surgeon Captain (D) R W Stevens, L D S R C S 21 5 63

RELEASED ON COMPLETION OF SHORT SERVICE COMMISSION

Surgeon Lieutenant P A Johnson and Surgeon Lieutenant (D) D J Cheetham L D S

WARDMASTERS

Member of the Order of the British Empire

Wardmaster Lieutenant Commander William Oliver Albert Austin
Promoted to Acting Wardmaster Sub Lieutenants S B C P O J A Hudley H W Page and D M C Pope.
Retirements Wardmaster Lieutenants J O Regan and W H Johnson Wardmaster Sub Lieutenant F Gay

QUEEN ALEXANDRA'S ROYAL NURSING SERVICE

To be a Member of the Royal Red Cross First Class

Miss Muriel Ernestine Myers A R R C Principal Matron (Tutor)

To be an Associate of the Royal Red Cross Second Class

Miss Gladys Ethel Robson H N N A

Promoted to Superintending Sister/Matrons Misses M Smith and B Williamson
Promoted to Superintending Sisters Misses S H Way R F Freyn and K F M Wiseman

ROYAL NAVAL RESERVE

NEW ENTRIES

Surgeon Lieutenant-Commanders E Cunningham M E R Ch
Surgeon Lieutenants R de Grindthorpe Hanson M B B Ch B A O B A R S Mackinnon M B Ch B D R McCoy M R D S M R C S L R C P D Obst R C O G
Surgeon Lieutenant (D) J N Cran B Ch D L D S
Acting Surgeon Sub-Lieutenants A Gibson and J N Davies

PROMOTIONS

To Surgeon Commander The Honourable G A Dingwall
To Surgeon Lieutenant Commander D N S Kerr

RETIREMENTS

Surgeon Commander R Vaughan Jones
Surgeon Lieutenant Commanders P M Kinlock J G H Jones C S Cane D H M Titcombe J I McL Forsyth J Ambler Smart J S Taylor J W Maybury A M Smith and R D Nicholson
Surgeon Lieutenant Commander (D) D M Watt and Surgeon Lieutenant (D) Bell

CIVILIAN APPOINTMENT TO NAVAL ESTABLISHMENT

Surgeon Captain W B Taylor L R C P L R C S L D S R N (Rtd) R M Barracks Eastney 1 6 63

No 4 Autumn 1963 Vol XLIX

Journal
of the
Royal Naval Medical Service

PUBLISHED QUARTERLY

(The Admiralty does not accept responsibility for the opinions expressed in this Journal)

PAGE

EDITORIAL 217

ARTICLES—
A Second Bite at the Cherry By SURGEON CAPTAIN B S LEWIS *D S C* M R C S L R C P R N 218
Man Explores The Sea By T F GASKELL M A Ph D 222
Alligator Hunt By SURGEON COMMANDER (D) F L HALL L D S R C S R N 232
Analysis of Fatal Drowning Accidents which Occurred in 1961 (reproduced by kind permission of The Royal Life Saving Society United Kingdom) 233

CLINICAL CASES—
A Study of Frostbite Treatment By WILLIAM J MILLS Jr M D (reproduced from "Naval Research Reviews" March, 1962) 237
A Clinical Case of Porcelain Crowns By SURGEON LIEUTENANT (D) B R OSBORN B D S L D S R N 244

EXHIBITIONS—
Royal Society of Health Exhibition Eastbourne 1963—The Naval Medical Contribution 248

REVIEWS 250

NEWS OF THE SERVICE—
Obituaries Higher Qualifications, Consultant Appointments Promotions New Entries Re-Entries Transfers to the Permanent List, Short Service Commission Converted to one of Five Years Retirements Released on Termination of Short Service Commission Wardmasters Queen Alexandra's Royal Nursing Service, Royal Naval Reserve Birth Announcement 256

ADMIRALTY FLEET ORDERS Inside Back Cover

NOTICE Facing Page

INDEX 259

EDITED BY
THE STAFF OF THE ROYAL NAVAL MEDICAL SCHOOL
ALVERSTOKE HAMPSHIRE



Editorial

THE majority of readers will be familiar with St Paul's Cathedral Malta, and be distressed by the accompanying photograph This editorial therefore is concerned solely with helping the following appeal which has been received from a very distinguished group

"Sir

St Paul's Anglican Cathedral, Malta

Over a hundred years ago Queen Adelaide built at her own expense a very fine church, now called St Paul's Cathedral to provide a worthy place of worship for British families working and living in Malta Many thousands of civilians and Servicemen have since used and come to love this Cathedral

'During the last World War Malta survived a long siege by a relentless enemy The Cathedral was damaged though not seriously Today it has been attacked by another equally relentless enemy—a beetle—which has so seriously damaged the roof timbers that they became dangerous The Cathedral has been closed and the roof demolished Services are being held in the crypt

"A fund is now being raised to repair maintain and endow the Cathedral- so that both its fabric and its ministry may be preserved and established. A total of at least £30,000 is required Of this £12 000 has already been committed to the reconstruction of the entire roof which is already in progress These sums are far beyond the resources of the British people in Malta most of whom are only on the island for a comparatively short time They have already done magnificently in raising the substantial sum of nearly £5 000 but we must now appeal to a far wider public

The Cathedral enshrines memorials to all those who died in defence of Malta during the last World War There must be many who could wish to see such memorials preserved There are others who have regularly worshipped there or who have family connections with the Cathedral There are also those who value and profit from the British connection with Malta

The Duke of Edinburgh and Sir Winston Churchill have taken the lead in contributing to the fund We hope that many others will follow their lead by giving generously

"Contributions may he sent by ordinary 3d letter either to the Treasurer HAFMED, Floriana, Malta G C , or to Lady Dorman, The Palace San Anton Malta G C and marked "For the Cathedral Appeal Fund

Yours,

Michael Cantaur
Stanley Gibraltar
Walter Cheshire
Maurice Dorman
Guy Grantham
Derie Holland Martin
Harry Luke
Thurlow"

Article

A SECOND BITE AT THE CHERRY

Being a further note on the Medical Library at R N H Plymouth

By Surgeon Captain B S Lewis, R N

The Medical Library was opened officially in its new estate at a short ceremony on 2nd December 1962 and since its Phoenix like emergence from the ashes of its bombings and the dust and dirt of its neglect there has now been time to look a little deeper into the contents of its venerable covers

Anyone who has served in Royal Naval Hospital Plymouth and visited the Surgeon Rear Admiral's office will recall the portrait of the formidable Captain Creyke First Commissioner of the Hospital which hangs on the wall behind the desk

Perhaps the most dramatic discovery during the process of cleaning and cataloguing was the finding of the manuscript report on the circumstances of the death of Captain Creyke signed by Stephen Love Hammick, the Dispenser in a battered volume of *Morbid Anatomy* published in 1797

Being written by a pathologist it was naturally almost impossible to decipher but at length only a few words defied all efforts at interpretation and the report read reasonably coherently as follows

Report on the death of Commissioner Creyke Royal Naval Hospital Plymouth December 5 1826

Gentlemen

Pursuant to your direction of the 3 November 1825 it becomes my painful duty to report to you the causes and circumstances attending the death of Commissioner Creyke which took place about nine o clock this evening Of the Commissioner's advanced age and enfeebled state of Health from a Complaint in his lungs of some standing every Member of the Board must have remarked in their late visits to this Establishment, but latterly he has been with few exceptions better than usual and on Friday week entertained a party of friends to Dinner The next day he was remarkably well when that evening was attacked with a rigor which lasted two hours—having been accustomed to these kind of attacks as well as to fainting he did not send for me. The next morning I found him as usual tho with diminished strength and he had some appearance of slight cold but on Monday Tuesday and Wednesday he had nearly rallied to his former state On Thursday he complained of a small axillary tumour just above his Spine which was poulticed and on that evening was seized with a violent pain at the bottom of both Heels where there was neither swelling, inflammation or increased Heat, on Friday and Saturday he was better on Saturday night he grew restless complained of a pain in the course of the pectoral muscle on the side of a small and on the following morning it was found that he was so weak that he could scarcely support his Head but in the course of that day he


THERE IS
DEATH
IN THE POT



recovered so much that he spoke with a certain degree of force in the [illegible] I found him not bright on Monday morning a black spot was discovered on the right side of the Chest which spread so rapidly that before two o'clock the whole covering of the thorax externally with a portion of the upper part of the abdominal muscles were black from Mortification up to this period the Commissioner had retained his faculties. They now began to wander and he rapidly sank till about nine o'clock when the scene closed

The tumour in the arm pit had remained stationery and the pain in the Heels the same he died without a single Hiccup or once having vomited

t have the honour to be
Gentlemen
Yonr most obedient Servant
Stephen Love Hammick'

The Commissioners,
His Majesty's Navy
London

Creyke s seniority as a captain was 1782 so he must have been well over 80 at the time of his death and still executive head of the hospital A similar report on the demise in *Status Epilepticus of the Head Pharmacist* one year later follows on the next page

As one leafed through more and more books it became apparent that in this library at any rate up to about the mid-18th century medical books were mostly expanded quotations and philosophical discussions on the teachings of the ancients Hippocrates Galen Aesculapius and others, with but little personal contribution

The most extraordinary stories were quoted quite uncritically such as the romance that the respiration of goats was carried out through their ears and that a sea horse placed in the hand of a woman in labour enabled her to be delivered with the same facility as a ewe at full time

After this period however observation, experiment and deduction became increasingly critical with excellent results in many fields of research. It was illuminating to read of successful transfusions in the Proceedings of the Royal Society as early as 1669 the donors at first being lambs calves and kids Arterial blood was considered very dangerous and venous blood only was used often in quite large quantities six to ten ounces being not unusual Some patients thrived on one transfusion, but none seemed to be able to take more than three without a fatal reaction

Alas, by 1830 a formidable amount of pomposity and hot air was already making it exceedingly difficult to extract even crumbs of information from pages of words strung together in involved sentences Fine examples of flowery prose come from the pen of William Hamilton M B of Plymouth.

Of medicine he wrote The history of medicine is the history of the human species uncontaminated by the cruel discords and fearful atrocities which stamp man with the visage of a fiend and the heart of a brute It is a history of peace and goodwill of endless harmony and unceasing philanthropy And again The discovery of the art of printing unbarred afresh the Gates of Heaven and let in that flood of light, enabling men to take their proper place in Creation second only to the Angels'

Fortunately, some authors were able to maintain the interest and even drama of earlier writers and well to the fore among these is Dr Matthew Tinman, who in his book *Food its influence in health and disease* wrote in 1842 The propensity to feed

[illegible] human flesh has sometimes manifested itself in a p[illegible] He relates how [illegible] lady was seized with an irresistible desire to partake of the flesh of a baker which she happened to see uncovered at his work and previnted an her husband to induce the baker, for a sum of money to let her have a bite at it Another woman in the same state killed her husband for the purpose of eating him and salted his body that it should remain the longer fit for food

A second rather terrifying statement from the same author reads In cases of weakness and disease, alcoholic liquors are extremely beneficial Very frequently a delicate female after her confinement and who is quite unaccustomed to the use of alcohol in any shape will take a whole bottle of brandy in a very short time without experiencing the slightest inconvenience from it but on the contrary she will find herself greatly invigorated though without this stimulus she would most likely have died from exhaustion

A sobering thought for modern husbands or is it?

Dedications were a very important introduction to most books in the early 19th century and few lack such an inscription Thus *Management of the Sick Room* dedicated to the ladies of Great Britain seems appropriate but the dedication of *A treatise on adulterations of food and Culinary Poisons exhibiting the fraudulent Sophistications* to the Duke of Northumberland appears in doubtful taste and to dedicate to Prince Albert a prize essay on *The use and abuse of alcoholic liquors* seems frankly rude

This I hope, enjoyable trip into the medical past would not be complete without an extract from *English Watering Places* by Dr Mortimer Deputy Inspector of Hospitals and Physicians at Haslar in 1842 who wrote Anglesey a village near Gosport, and within a mile of Haslar Hospital has lately risen to great importance as a sea bathing place and an extensive range of spacious houses has been erected facing South and looking upon Spithead and the Isle of Wight from which it is distant only three miles It is situated near the shingly beach and clear water of Stokes Bay

The complaints that a residence at Anglesey combined with sea bathing is likely to benefit, are those scrofulous affections that occur in relaxed and feeble constitutions, nervous diseases hypochondrias gout and that general ill-health which has been entailed by CONSTANT AND OVER ACTIVE MEDICATION

Well, who should know better than he?

Acknowledgment

The Photograph of Surgeon Vice-Admiral D D Steele-Perkins, *C B; C V O* Q H S which appeared in the Summer issue of the Journal was published by kind permission of Hay Wrightson of London

MAN EXPLORES THE SEA

By T. E. GASKELL

Reproduced from Journal Royal Society of Arts No. 5086, Vol. CVI

THE new explorers of the 20th century can no longer follow in the footsteps of Captain Cook and his successors. All the continents have been discovered and since the advent of the aeroplane with its ability to scan vast areas, it is extremely unlikely that there is even one little island to be found. But there is plenty of room for adventure—the new paths of exploration lead upwards and downwards. We may, in the near future, find out what the moon is made of. At the same time the Mohole Project to bore through the earth's crust will tell us what kind of rock forms the greater part of our planet. Meanwhile, there is a large amount of fact finding to be done at the earth's surface and since nearly three-quarters of the surface of the earth is water, the major part of his work must be carried out at sea.

You may wonder why the sea has been so neglected by science. Sir Frederick Brundett, in a recent lecture, put his point very forcefully. The world, he said, must be *mad* to spend more in a year on space research than has been spent on studying the oceans in the last 100 years. An island nation like ours, with a great maritime tradition—but unfortunately today lacking in the enormous sums needed for transporting elementary experiments to the moon or the planets—is most suited to get value for research money if it applies its efforts to the many problems associated with the sea, leaving space exploration to others. There are many very practical reasons why we should find out a good deal more about the sea. There is also a fundamental reason. For the first time in man's existence tools, such as the massive capabilities of modern civil engineering or the largest nuclear explosions which compare in magnitude to such national catastrophes as the Krakatoa earthquake, are in our possession so that we have the strength to affect normal working of the earth. This power must be used with caution and before larger projects are put in train a full understanding of the consequences must be known. For example, there has been a proposal to block the Behring Straits with a view of warming up the northern parts of Siberia. Such action might, however, do too much warming up by a change in the circulation of the ocean. If most of the polar ice were to melt there would be a rise of a few hundred feet in sea level. A glance at a map will show the effect of such a change in sea level on many of the major cities of the world. We must know how nature operates before we use our new found strength to make major alterations to the earth. From our present meagre knowledge of what controls the earth's climate, we can deduce that quite small beginnings may lead to slow but inexorable changes. We know for example that in the past tens of thousands of years Europe has been in the grip of ice-ages. It is our duty to future generations to discover more about these changes,

so that none of our actions shall lead the human race down what may turn out to be an ever steepening slippery slope

Although we may quite rightly be somewhat ashamed of our lack of knowledge of the sea (we were surprised and red faced during the war when we had to study the waves at the surface of the sea one would have expected at least this visible part to have been thoroughly investigated) there are good reasons why advances have been slow The sea is a difficult place in which to work

Sea water is of course opaque and this is the first difficulty that faces the oceanographer Most of the tools needed to investigate the sea must use physical principles which are more complicated than the optical methods that are so satisfactory for studying the surface features of the land As if this were not enough sea water contains enough salt to be neither a really good conductor of electricity nor a useful insulator so that in this respect also it is more difficult to work in than is the atmosphere The salt water also militates against the scientist by being corrosive and to ensure that experiments shall be conducted with the maximum of difficulty and discomfort the sea surface is seldom still * The great depths of the oceans are associated with correspondingly large pressures the top 30 feet being enough to double the atmospheric pressure The only measurements of comparable nature in this respect are those made by oil company engineers when they record the properties of underground reservoirs Then again the greater part of the oceans is about three miles deep so that when apparatus must be lowered to the sea bed long cables are needed But nowadays apart from the ability to work at sea we now have much better materials to enable us to make measurements We have better cables better winches for winding them better recording equipment and modern computer techniques for handling the mass of observations that are associated with the enormous volume of the oceans It is most opportune that our strength to alter the face of the earth is matched by our skill in measuring what goes on in the world (and in delving into what has gone on in the past too) Those who control things must remember however to encourage fact-finding research before they are tempted to embark on ambitious schemes which may possibly have dangerous long-term consequences

It always seems to be easier to obtain financial support for science when there is some connection with defence Oceanography is no exception to this and there is no doubt that the increase in activity that has been apparent since the war has been sponsored and inspired by the navies of the world

Submarines go ever deeper they stay submerged longer and therefore require a better knowledge of the shape of the deep sea floor than was needed by surface ships whose navigational worries really only start at the hundred fathom line The detection of submarines calls for a better understanding of the propagation of sound waves and hence of the temperature and density distribution in the sea Landing operations during the war demonstrated the need for a reliable forecasting of waves and of the changes they wrought on beaches

There has been also of recent years a demand for a more complete understanding

* Sir Edward Bullard points out that the recent upsurge of keenness in oceanography is correlated with the development of modern seasick remedies

of what goes on in the oceans from the specialists who are engaged in peaceful pursuits. The realization that oil deposits do not stop at the coast line has led to a whole new field of oil finding, and the offshore prospects have brought with them their particular oceanographical problems. Offshore geophysics is to a large extent an adaption of the work that was started by such pioneers as Professor Maurice Ewing and Sir Edward Bullard. The difficulties of offshore drilling have been overcome, and now the oil companies are able to assist research oceanographers in their deep water drilling projects. New oil terminals and offshore loading lines call for a thorough knowledge of wave conditions and of underwater currents which may affect pipelines laid on the sea bed, while cooling water intakes for power stations have to be designed to withstand the forces of storm waves and the long-term possibilities of shifting sands.

Although the studies of the sea that are made to satisfy the requirements of submarines and of offshore mineral and engineering work are of great importance and interest to oceanographers, there are other aims which future historians may well believe to be of even greater value to mankind. These are food production in the oceans, the removal of waste, and the effect of the sea on climate. To these may be added the interest of the natural philosopher in what the earth is made of and how it arrived at the state in which we find it today. Some of you may recall the paper that Dr. Laughton gave to the Fellows of this Society in 1957. The subject of Dr. Laughton's address was "Exploring the Deep Ocean Floor". Tonight I shall avoid as far as possible covering the same ground. The United States Hydrographer explained it very aptly when his title was recently changed to Oceanographer, by saying words to the effect that "We must study what is in the bucket as well as the bucket itself". Although the shape of the bucket, especially the deep ocean floor, is of greater interest for purposes of navigating deep submarines, the water itself is becoming of increasing importance, not only for immediate practical purposes of the effect of waves and currents on ships and structures, and operations that take place along the shore, but also for the long-term problems of food, waste and climate. Since my main oceanographical interest comes under the heading of curiosity about the inside of the earth, I shall extend Dr. Laughton's discourse by saying a little about what you may expect to find below the sea floor—what you discover in fact if you drill a hole through the bottom of the bucket.

In the long run, the study of fish in the sea may be the most necessary of all oceanographic researches because we shall increasingly be made to turn to the sea as a vast food producer by the increase in the population of the world. At the present time the fishing industry is, in some ways, at the stage at which primitive man was many centuries ago—we hunt the fish that nature provides, just as our ancestors hunted animals for food. We have not yet begun to herd fish or to improve their quality—but one day we shall be forced to farm the seas as we do the land.

The rule for life in the sea can be summed up in the well known expression "big fish eat little fish". The beginning of the line is the growth of minute plant-like algae which form organic matter from carbon dioxide dissolved in the sea water with the addition of traces of metallic elements such as phosphorus, and with the help of light to activate the whole process. Small animals of many curious shapes form the

next link in the chain and they and some of the larger plants together form the drifting food of the oceans which can be collected in a fine net as plankton However although plankton has been eaten in the form of soup it is not to everyone's taste and more usually except in certain keen oceanographic circles it is left to larger fish to convert the plankton into something more palatable to human beings

This chain of events is not unlike some aspects of agriculture Cattle eat grass which grows by synthesising complicated organic compounds from carbon dioxide with the help of beneficient rays of the sun's light There is a great difference however in what man has achieved with nature's processes On land he has improved the strain of cattle by careful breeding At the same time the productivity of the land has been increased by fertilizing and by weeding It is almost certain that a similar approach to the sea will enable us to harvest much larger crops of fish instead of worrying as we do now about protecting local fishing rights from the depredations of fleets from other nations We should be able to produce plenty for everybody's needs if we discover and apply good methods of sea husbandry

There are areas of the oceans in which there is virtually no plant life and hence no fish life and it is at first sight surprising that these deserts lie in the warm tropical zones where it might be expected that the bright sunlight would have been conductive to prolific growth On the contrary the best growth occurs in the cold sub-arctic regions where for many months of the year there is very little daylight. The reason for this is that in hot calm areas a layer of warm surface water rests in a stable condition on the colder deeper water Any life that once may have existed in the warm layer soon used up all the phosphorus and other necessary trace elements that life needs and with no mechanism to replace these fertilizers, the sea became barren In the fertile areas of the sea the nutrient salts are continually renewed by means of the currents of the oceans that circulate water from the depths There are some places where disaster occurs because so many fish grow in the fertile upwelling zone that they use up the oxygen dissolved in the water and suffocate Of course the sea retains all the useful fertilizer which falls to the sea bed eventually but it seems a terrible waste to lose a vast crop of fish by over fertilizing One can think of ways in which such natural processes might be guided so that accidents are avoided and in order to do this a thorough investigation of all aspects of the animal and plant life and of the circulating currents is necessary It might be possible for example to supply oxygen to those parts of the sea where the fish life was getting temporarily out of control More practicable perhaps are the proposals to set up local upwelling currents which will bring the nutrients from the sea bed and the deeper water to the surface zones where sunlight allows plant life to grow There are parts of the sea where the bottom water is less salty than that at the surface so that at equal temperatures the bottom water is lighter It may be possible to pump this water to the surface in order to start a circulation which will eventually be almost self maintained Perhaps more promising for the next century when the human population explosion may make protein from the sea of acute importance is the potential of heat from atomic piles placed on the deep sea bed However there is no point in working out detailed inventions at the present time Our generation must spend their efforts in finding out how nature works when the real need for ingenious schemes comes there will be

plenty of engineers to devise means of overcoming the technical difficulties they have never let us down yet

There are many ways in which fish productivity can be increased before we are forced to mammoth projects of current control Research shows that great losses occur in the fish cycle because small fish are eaten by larger ones and in many cases the larger fish are not fit for human consumption A great saving can be obtained if the good fish are reared through their feeble vulnerable adolescent stages in some sheltered enclosure before being put into the main stream of fish life We can even ensure that the rules that are already established to conserve fish life are properly kept. Some fishing fleets use nets with too fine a mesh and so take young fish which have not reached optimum size

In order to preserve fisheries for those who are prepared to improve them it may be necessary to 'farm' fenced in areas of the sea This could possibly be done by bubble screens or by some form of electric or acoustic pulses or even by the use of naturally enclosed waters such as the lagoons of coral atolls In these enclosures unwanted fish would be gradually eliminated and young fish would be protected from the cannibal activities of their elders The sea floor would be ploughed over to allow useful materials to dissolve in the water, and weeds on the sea bed would be discouraged It is said that such inedible animals as star-fish take up about 80 per cent of the nutrients in the North Sea Although when they die they return the phosphorus and trace elements to the sea bed they lock up a great deal of material which might be better employed There may be a good reason of course for nature operating in this way and this is why it is important that we do find out more about what goes on now and how and why it does so It may well be useful now however to try out some experiments in confined areas of sea because by this means it would be possible to discover any unforeseen snags associated with our meddling with natural behaviour

A warm lagoon might well be the place to determine the limit to the cropping of fish that is possible when plenty of fertilizer is supplied This type of experiment might be combined with attempts to breed strains of fish which are popular gastronomically while being rapid and cheap producers of protein This point may be important because although the problem of feeding large extra numbers of world inhabitants could possibly be met by new methods which have been devised for producing protein from grass without the aid of a cow or even by allowing suitable microbes to feed on petroleum it is difficult with new foods to persuade conservative people to eat them It may well be that the cheap new proteins could be passed through a rapid fish cycle to make them acceptable As I said engineers, and especially chemical engineers, can do almost anything that is required, if only the world will make up its mind as to what it wants

There is one further reason for spending our efforts on fact finding research about the sea There may be many places in the vast oceans where active circulation allows a good regular crop of fish but which have been missed in the past because they are out of reach of short range fishing fleets The Japanese who need protein and who like fish have already discovered lucrative grounds in the Pacific and Indian Oceans and they have done this with the assistance of qualified oceanographers, who with

their measurements, have been able to indicate likely areas of high plant and animal growth. It has, for example, been reported recently that an upwelling area exists in the Arabian Sea, because of large quantities of dead fish that have been observed floating on the surface. This may well be the information that leads to new fruitful fishing grounds, well placed for a country like India with a rapidly increasing number of mouths to feed. The first task, therefore, is to step up our efforts in exploring the oceans and in discovering how fish live and behave. This will lead to new sources of food for our immediate requirements, while at the same time providing the basic knowledge needed for engineering ingenious new projects for the future.

Another important reason why we must learn more about the circulation of the sea is associated with the new source of power that has been made available to our generation—nuclear energy. The sea has been man's rubbish tip since time immemorial. Those who lived at the sea side used the sea directly, while those who were further inland tipped their gash into the rivers. The waves that beat on the seashore and the undertows and along shore streams associated with the tides are luckily effective in mixing the refuse with larger quantities of sea water so that dilution can take place and so that bacteria and fish can play their part. When the population becomes too dense, natural rubbish tips are overwhelmed. It was not so very long ago that sewage outfalls above Westminster caused such concentrated bacterial action in the Thames that the dissolved oxygen was used up and unpleasant reducing conditions with concomitant evil smells developed. The seat of government being where it is, the outfalls (and the smell) were soon removed to down-river positions, and in recent years the treatment of sewage before pumping into the river has been improved. However, the lesson is easy to read in these days of increasing urban populations: great care must be taken to find out to what extent natural tides and currents can remove our rubbish, and when these natural resources are overloaded they must be augmented by suitable engineering works.

The world is only just beginning to realize the value of pure water. In places like Kuwait, where fresh water has been shipped by dhow for centuries from the Shatt-el-Arab River, the discovery of oil and natural gas has allowed, by what is one of the kinder strokes of nature, large distillation plants. The fresh water produced here is already one of the most important products that are obtained from the sea, and as population increases rapidly in places like California, the minds of forward planners are turning to similar schemes. Luckily, the vast heat potential of nuclear power should be readily available when things become desperate.

Professor Oliphant has recently proposed atomic power stations in Western Australia as means of making large volumes of fresh water to render fertile some of the vast Australian deserts. The water would be stored in newly formed lakes which themselves might possibly produce some improvement in the local climate. However, nuclear power has its own built-in problem of waste. Radioactive products which take ten years to lose their activity must be disposed in some safe place. Provided sufficient dilution occurs—and the 300 000 000 cubic miles of sea water in the world could provide adequate dilution—there is no potential danger. But careful measurement of the ocean currents must be made to ensure that mixing takes place before any effluent is pumped into the sea. There is one other possible hazard, associated

with life in the sea that is seaweed concentrates iodine by extracting it selectively from sea water so some of the radioactive products may be concentrated in fish if dilution is not sufficient before the fish feeding grounds are reached

One of the advances that is being made in our generation of rapid change—and it is rapid we have had air travel and television in my lifetime—is in understanding the weather This may appear a slight over-statement to those of us who enjoy—or perhaps suffer—this island climate but the tools and the ability are now available to learn much more about the climate of the earth than ever before The Tiros satellites are busy photographing the cloud pattern from the outside, and already these photographs have provided a much better over all idea of how wind circulation patterns develop and change This makes it more important to discover the interaction of the atmosphere with the sea. We know that there is an exchange of energy from the air to the sea regular winds for example, determine the great surface currents of the ocean, such as the Gulf Stream in the Atlantic but the details of how the sea affects the air streams are not properly understood The sea has an enormous capacity for absorbing heat and the small temperature range between the coldest and hottest sea surfaces means that the sea is a stabilizing influence in the earth which is subjected to daily heating by the sun One of the main objectives of the International Indian Ocean Expedition is to correlate the weather with the ocean currents and temperatures The Indian Ocean differs from the Atlantic and Pacific Oceans in being enclosed by land at the northern end and this causes the wind pattern to change direction during the year This in turn makes the ocean currents alter direction By observing the time lag between wind and current a great deal will be learnt about the rate at which the wind builds up its driving action on the water This is not readily done in the Atlantic or Pacific where the regular trade winds induce a regular current system

Although from time to time claims are made that the weather can be controlled, no definite evidence apart from a possible local change in rainfall, has been produced Thus probably is just as well, for until the mechanism of weather changes is fully understood it would be premature to take what might be an irreversible step by making some major alteration Another reason why the circulation of the ocean water is important is in the behaviour of carbon dioxide in the atmosphere Because of its particular absorption of radiation carbon-dioxide like glass in a greenhouse, allows high temperature radiation to enter the earth's atmosphere, but stops the low temperature radiation from the earth from escaping An excess of carbon dioxide in the atmosphere might possibly cause our earth to warm up (a pleasant thought no doubt in these latitudes) but it is probable that the sea acts as a vast reservoir for carbon dioxide and thus produces long-term stability Nevertheless it is the duty of today's oceanographers and geophysicists to maintain a careful watch on these matters which might be delicately poised even if they do appear to have plenty of built-in stability

Although we still catch fish in much the same traditional manner that has been used for hundreds of years our investigation of fish behaviour has been improved by new tools such as echo sounders and underwater listening devices cameras and television One of the most useful developments since the war has been in the ability to swim freely underwater with the aid of the aqualung Although diving only allows

[illegible]—and this is only a small layer of the sea which [illegible] about 20 000 feet deep over the greater parts of the oceans—it is this top layer which is illuminated by sunlight and is therefore important in many of the phenomena associated with the life-cycles of the sea. Aqualung diving is becoming a very popular sport and I personally have great hopes that the large band of keen amateurs who take part in this activity will help in many problems associated with the sea. A similar group in the earlier days of wireless—the radio hams—provided a most useful contribution to the scientific investigations of the upper atmosphere and are still active in many ways in improving our knowledge of short-wave propagation.

The ability to work in shallow water without walking on the sea bed with lead boots and stirring up the mud has been of great value in advancing the frontiers of archaeology. Many fascinating discoveries of old ships have been made in the Mediterranean for example and since the sea bed is a quiet place maintained at an almost constant temperature the evidence from ancient civilizations are usually much better preserved than they are on land. I have recently come across a new book—*Under the Mediterranean*—which sets out very well the type of investigation that is going on today. While this work may appear at first sight to bear little relation to our world wide oceanographic studies of currents fish habits and underwater geology there are instances where ancient techniques evidence of changes in climate or of tidal streams and changes in coast line may be very valuable to our modern studies and their practical applications.

In the oil business we have availed ourselves of the ability to operate underwater in many ways—in studying the sea bed geology in finding suitable routes for pipe lines and in inspecting underwater installations for corrosion silting up or any other annoying things that go on beneath the sea. I would like to give you some pictorial examples of this in this short film about our oil-finding activities in the southern part of the Persian Gulf. I will not claim that diving is our own innovation in these waters since for centuries it has been the location of a pearl fishing industry. However the aqualung does enable us to work for longer periods underwater than was possible with the human lung.

FILM

You will have noticed that we place the valves and control gear for our oil wells on platforms built up from the sea bed. One of the developments that we are now working on is to leave all this part of the well on the sea bed and to run the pipe directly to the shore. The advantage of this will be firstly that we do not need to build expensive structures, which may in any case be a nuisance to shipping but also that we can operate in much deeper water since the largest platforms that have been made are only capable of standing in a little over a hundred feet of water.

One of the new developments that we are following with interest is the possibility of living underwater. You will have read about last year's experiment when Commandant Cousteau's team of divers lived underwater for several days, and of the more ambitious plans proposed by Mr. Ed. Link to operate at depths of 100 feet and more. If these techniques are perfected it may well be possible to perform a complete pipe-laying operation from the sea bed itself rather than from the large craft that you saw

in the film. In any event, the underwater living places should form excellent laboratories for observing fish behaviour, and as Cousteau has suggested for breeding fish more efficiently in specially constructed sea bed shelters. I leave it to your imagination to think of many other applications of the underwater house to fish farming, because our primary aim at present is to find facts and leave the application to the future.

One of the aims of deep diving is to be able to work at 1,000 feet underwater. This will put virtually all of the continental shelf areas of the world within our reach. Apart from our ability to complete oil wells it may provide means for obtaining other minerals. Diamonds are being dredged from the sea floor off West Africa, and it is possible that other valuable minerals may be waiting to be exploited. Although such development would almost certainly be operated from the sea surface, exploratory visits may be required for preliminary surveys and for adjusting the apparatus.

Submarines already go down to depths of 1,000 feet, and the special bathyscaphs have reached the deepest part of the ocean—the Challenger Deep in the Marianas Trench. The use of submarine craft for oceanographic investigations are, however, limited, because of the poor visibility even with good underwater searchlights. We cannot sit near the sea bed and view the underwater scenery from miles around, as we can if we sit on a hill top. It is as if we sat on a hill top during a mist. While this is unfortunate, there are some investigations in which a personal visit to the sea bed could help. It may be easier to identify peculiar shaped objects if they can be observed for a considerable time rather than for the short duration of a photograph flash; for example, animals might be distinguished from stones by seeing them move. On the other hand, it may be just as effective and cheaper and safer to use a television camera.

Most of our oceanographic observations are still made from ships at the surface of the sea, either by lowering instruments on wires or by measuring magnetic or gravitational fields or sound waves from instruments on the ship or suspended from the ship or from buoys. Measurements of the temperature of the sea at depths all the way to the bottom are made by suspending a line of instruments which at the same time enable samples of water to be collected for analysis to show the salt content. These measurements make it possible to track the ocean currents and to predict the flow of water, because from them we can calculate the water pressure and can then deduce the water in the same way that we predict winds in the atmosphere from readings of barometric pressure. These calculations of currents are supplemented by direct readings of current obtained from meters suspended from the ship or placed on the sea bed, and by floats which are adjusted to travel at any desired depth. These floats are followed by means of acoustic signals received on board ship. The oceans are so vast that many years of this type of work lie ahead, most nations of the world realize this and for this reason co-operate in programmes such as the International Geophysical Year or our present International Indian Ocean Expedition.

Although current measurements and studies of life in the oceans are probably the most directly applicable of the various activities of the oceanographer, a great deal of exciting exploration is going on beneath the sea bed. One of the interesting questions that will be answered by this work is whether the continents have always been in the position in which we find them today or whether as some believe, the

Atlantic is a comparatively new ocean formed when America parted company from Europe and Africa. Last year H.M.S. *Owen* made magnetic and gravity surveys in the Indian Ocean. The magnetic readings that were taken off the East African coast suggested a thick layer of sedimentary material as would be expected if, as some suppose, India drifted away from Africa some 100 000 000 years ago. The gravity results tended to confirm this theory.

There is one odd group of islands, the Seychelles, which are made of granite. They do not appear to be volcanoes; in fact they are more like the African continent than normal oceanic islands. Some geologists believe that the Seychelles are a remnant that was left behind during India's move. The gravity measurements made by H.M.S. *Owen* may give an important clue as to whether this is true. Several crossings were made from the 30-fathom-deep plateau which contains the Seychelles group of islands and the picture that the gravity meter drew is very much like that which is found when crossing the shelf that forms the border between continents and deep oceans.

These preliminary results will be checked by a third tool for probing the rocks of the sea bed. This is the seismic method which makes use of artificial earthquake waves produced by letting off explosions. Just as we investigate the inside construction of the earth by observing the time it takes earthquake waves to travel through the earth, so we can find out how thick are the sea bed layers of rock with the weaker explosion waves. But there is another method of making an even more direct probe—that is by drilling a hole as we do in the oil industry. The Americans are working on a project to drill through the earth's crust to a simple, the mantle. This will tell us what material forms the bulk of the earth. But there is an easier project which will probably yield the most interesting results of any experiment to the ocean going geophysicist. This is to drill through the sediments that have accumulated for millions of years on the floor of the ocean—and which may show an undisturbed picture of what has been happening to the earth during its past hundreds of millions of years of growth. Many cores in different parts of the oceans will be needed, but the reward will be great. We shall certainly be able to answer the question of continental drift, because if the Americans were once joined to Africa and Europe the Atlantic must be a comparatively young ocean.

Our aim today then is to find out all about the earth, and since most of the surface is covered by sea, fact finding in the oceans is of primary importance. We must find out all we can about the geology of the earth so that we can look our friends from Mars straight in the eye if they ask us what we know about our own planet. We must concentrate on collecting facts about climates and about ocean circulation, so that we are able to avoid catastrophic mistakes by playing with fire before we are old enough to control it. We must learn about life in the sea so that we are ready to feed our rapidly increasing body of descendants. We may even gather a few tips from our sea animal friends in concentrating valuable minerals. There is no need therefore to ask why we want to find facts about the sea. These facts are the basis of any large projects to improve our livelihood, and now that we have the tools we must make these measurements, rather than go in for expensive schemes which may have disastrous long term endings.

ALLIGATOR HUNT

By Surgeon Commander (D) F. L. HALL, R.N.

I was not a member whose idea it was but I think it all stemmed from talk at [illegible] the [illegible] of alligator handbags! We were anchored at the time for a [illegible] ship and felt a bit [illegible] period in a small bay on the south coast of Jamaica.

It was midnight when the three of us left for the shore. We were towed to the edge of the mangrove swamp in our inflated rubber dinghy with another in tow behind as we had neither wish nor indeed room to share our cramped quarters with our hoped for trophies. The motor boat left us having arranged a rendezvous at dawn and as the noise of the engine receded in the distance the myriad noises of the insect life took over in the eerie stillness of the pale moonlit tropic night.

Our campaign was simple. One in the stern with a double ended paddle, the others forward taking turns with a Lee-Enfield rifle and a portable spot light signal lamp. With dawn five hours away each of us would have a reasonable spell with the rifle. At night alligators lie with only their snouts above water and one paddles silently along the mud banked tortuous channels of the swamp with the spot light playing on the water ahead seeking the red reflections of the creatures' eyes. The hunt is not as simple as it sounds, silence is all important. Frequently we ran aground on the mudbanks or mangrove roots and there was nothing for it but for one or more to go over the side and push off. One can sink in the black slimy ooze up to the thighs or higher, ever fearful of treading on reptile or water snake.

When at last we had the thrill of seeing two eyes reflected in the light, the excitement of the slow silent stalk began. The light must not waver, the paddle must make no sound. Even then in most cases the eye reflection disappears as the reptile sinks slowly below the water before one can fire. We did get two that night and one of those was mine. I was thankful for a full magazine as my first round only wounded him and he came straight for us with thrashing tail. It took two more to finish him off at about ten yards. This was the climax of the night with excitement enough, and over, for all. The noise we made sent every self respecting alligator to the bottom.

We didn't have long to wait for the dawn and the sight of the motor boat coming to collect us was welcome. Back on board, the ship's butcher set to on the carcases and the sharks had an unusual breakfast. Despite our efforts at skin preservation they were not suitable for making up, and I had to buy a handbag after all. But I wouldn't have missed that night for anything.

ANALYSIS OF FATAL DROWNING ACCIDENTS WHICH OCCURRED IN 1961

1 *Background* The analysis has been made to meet three particular requirements

(a) to provide a general picture of the pattern of drowning accidents in the United Kingdom to serve as a guide in the preparation of a new Handbook of Instruction for the Royal Life Saving Society—United Kingdom

(b) To amplify the figures published by the Registrars General in their yearly statistical tables The absence of more detailed information has produced a tendency particularly in articles published in the national and provincial Press to refer to the months from May to September as the drowning season and a widespread belief in the minds of the general public that the drowning risk lies primarily in sea bathing

(c) to provide information for the National Water Safety Campaign

2 *Basic Information* The Commissioner of the Metropolitan Police the Commissioner of the City of London Police, the Inspector General Royal Ulster Constabulary and all Chief Constables in the United Kingdom were invited in January 1962 to help in this project by giving details on a form provided by the Society of fatal drowning accidents which occurred in 1961 in the areas under their jurisdiction The age and sex of victims were asked for but no other personal details A total of 151 reports were received and the Society is sincerely grateful for the generous assistance given by the Police Force throughout the United Kingdom

3 Details of 1 327 reports of death by drowning have been analysed

	Suicide	*Others*
England and Wales	258	842
Scotland	37	150
Ulster	3	37
Totals	298	1 029

Provisional figures for 1961 provided by the Registrars General are

England and Wales	not yet available	775
Scotland	42	177
Ulster	9 (final)	33 (final)
Totals	?	985

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4 *Fishing* Thirty-four deaths one under the age of 6, 12 in the age group 6 to 10 years and three in the age group 11 to 15 years Nine victims are recorded as non-swimmers eight as fishing alone and three as non swimmers fishing alone Additionally five fishermen fishing from boats are recorded

5 *Bathing* One hundred and sixty five deaths 77 in the sea and 88 in inland waters Fifty six cases involved children under the age of 16, the majority of these accidents occurring in inland waters

Air beds inner tubes etc accounted for six accidents all occurred in the sea and involved children aged 7—two 10—one, 11—one 12—one and 13—one

Swimming and bathing at night cost nine lives all in inland waters

Attempts to save others resulted in 24 deaths 10 in the sea and 14 in inland waters the latter including six children aged 7 8 10 11 14 and 15 In addition two cases involving children aged 6 and 7 are included in para 4

Swimming baths Eighteen deaths Details of seven accidents were not given but included children aged 2 9 13 and 14 The remainder were

M 13 trying to swim a length
M 14 fell from diving board and struck his head
M 30 found lying on bottom of crowded pool
M 12 one of class under instruction seen on bottom.
M 6 trying to recover shoes which had fallen in
M 10 non-swimmer playing in shallow end body recovered from deep end
M 17 not a strong swimmer in a crowded pool
M 12 non-swimmer in deep end despite warning
M 10 swimming with child aged 8 in a pool which had been closed for the season trespassing
M 8 non-swimmer found in deep end
M 16 hit his head when diving but not noticed at the time

6 *Cornish Surf Beaches* The prevention of drowning accidents on the Cornish Surf beaches which claimed 22 lives in 1961 is a particular aspect of the problem which is being tackled with vigour by the Local Authorities and the Surf Life Saving Association of Great Britain and involves the use of reel and line equipment The effectiveness of the measures being taken is shown by the following figures supplied by the Chief Constable of Cornwall

	Number drowned	Number rescued	No of separate incidents	No of occasions on which equipment was used
1959	13	35	39	6
1960	17	42	33	15
1961	22	40	37	15
1962 (to date)	8	48	42	20

7 *Boats* One hundred and sixty one deaths

Sailing boats	5
Motor-boats	58
Rowing boats	38
Canoes	28

Recreation accounted for 107 deaths 25 victims fell overboard and 82 were in boats which capsized or were swamped Victims included 17 children under the age of 16 years

Details of five accidents were not given and 49 deaths resulted from occupational hazards

8 *Motor Vehicles and Bicycles* Twenty six deaths

9 *Alcohol* Thirty three deaths were directly attributed to the influence of drink

10 *Accidents in Homes* Fifty four deaths including 25 children under the age of 16 years of which 23 were in the 0 to 5 years age group Ten children of this age group were drowned in ornamental ponds and streams running through gardens, and 11 in water butts and tanks in gardens

11 *Home made Rafts* Thirteen deaths all in inland waters included seven children in the 6 to 10 years age group and four in the 11 to 15 age group

12 *Children Playing Near Water* resulted in 172 deaths of which 50 occurred in canals and 58 in rivers and streams

This involved 89 children in the 0 to 5 age group and in 28 cases (31 per cent) the reports specifically state that there was no adult supervision The circumstances of many of the remaining 61 cases and the 23 cases involving children in this age group in accidents in homes make it appear likely that there was a lack of adequate supervision

In a number of cases, not excluding those in the lowest age group the children climbed over or under fences and through barbed wire to get near water

13 *Accidents Involving Children Under the Age of 16 Years* Excluding suicides and unknown causes the number of deaths analysed in 732, of which 304 (41 55 per cent) involved children under the age of 16 years

0 to 5 years	(118)	16 per cent
6 to 10 years	(117)	16 per cent
11 to 15 years	(69)	9 5 per cent

14 *Artificial Respiration* was applied, using one or more methods, in 377 cases In the 732 purely accidental deaths, artificial respiration was applied in 298 cases (41 per cent)

The various methods were used

Holger Nielsen in 147 cases
Schäfer in 110 cases
Expired Air in 26 cases
Mechanical means in 90 cases
Method not stated in 93 cases

From the details given it seems likely that in a number of cases reported under the heading of "mechanical means" an oxygen mask was used without any associated mechanical resuscitator

In a number of the accidents in homes and of those involving small children it is evident that artificial respiration was not attempted until arrival of police officers or an ambulance when the time lag had made the probability of its success very small It also appears that in a number of other cases the victim of an accident was recovered very quickly from the water and that the chance of saving life would have been high

had artificial respiration been applied at once These cases demonstrate the need for a far wider knowledge of how to apply some method of artificial respiration particularly amongst parents and others responsible for looking after children and sick and aged people

15 *Conclusions*

(a) Of a total of 1 029 deaths excluding suicides 23 5 per cent occurred in the sea and 76 5 per cent in inland waters

(b) The months from May to September (42 per cent of the year) included 54 8 per cent of all deaths by drowning in 1961

(c) Of a total of 732 purely accidental deaths 304 (41 5 per cent) involved children under the age of 16 years

(d) In bathing and swimming the most vulnerable age group amongst children is 11 to 15 years

(e) Canals and rivers claim the highest number of deaths (99) amongst children in the age groups 0 to 5 (57) and 6 to 10 (42)

(f) Inability to swim is a major factor and there is an urgent need to teach more children to swim and to teach them at an earlier age

(g) Lack of adequate supervision and unjustified reliance on fences are major factors in the drowning of children in the lowest age groups

(h) The majority of accidents occur in circumstances in which special life saving equipment is neither available nor necessary to prevent loss of life but many more lives could be saved by a wider knowledge of individual methods of life saving amongst members of the general public,

(j) There is a need for a much wider knowledge of artificial respiration

(k) It is not possible to produce statistics from the information available but it seems likely that in the majority of accidents in boats no form of life jacket was being worn, even by non swimmers

Signed E HALE, C B E,
Chief Secretary

Clinical Cases

A STUDY OF FROSTBITE TREATMENT

By WILLIAM J. MILLS, Jr., M.D.

If our armed forces expect to continue activities in frigid zones it is highly necessary that all ranks and ratings—especially all medical personnel—acquire a sound working knowledge of the prevention and treatment of the various types of cold and other injuries. Fortunately the Bureau of Medicine and Surgery and the Office of Naval Research have sponsored continuing research on these problems both in laboratories and in the actual environments of extremely bitter cold in the polar and sub-polar areas. A great deal has been learned, but there still remains an urgent need for new knowledge if man is to be given the best possible opportunity of survival in these extremely dangerous regions of the world.

Frostbite may be defined as the cooling of the body tissue to the point of ice crystal formation. There are numerous classifications as regards severity: durations of exposure, type of cold (wet or dry), rapidity of freezing and other factors. A variety of signs are usually listed to determine the "degree" of frostbite and therefore to guide treatment. Although some differences in management will exist between the more trivial and the serious cases, it is apparent that, as in burns, even the experienced clinician will have great difficulty in accurately classifying the severity of injury early and that a more simple classification as to "superficial" or "deep" would probably be more suitable.

The interest of three Alaskan physicians* was aroused in this problem early in 1955 by a group of patients who had sustained clinical frostbite and all of whom had, as a result, one or both of the lower extremities amputated at levels varying up to the low thigh. Frostbite has been treated by such highly variable methods as packing the part in ice, primary application of pressure dressings, sympathetic block, insulation of the affected part at room temperature and the application of local heat in many forms, including the use of diathermy. These programmes have frequently included debridement, amputation or both. It was realized that some variation in treatment is to be expected among a group of physicians and that individual cases may demand some adjustment of methods. Nevertheless, they felt that the wide latitude of treatment permitted between packing the part in ice or immersing it in a warm bath or between considered watchful neglect or early amputation above the site of demarcation could profitably be narrowed. So they were stimulated to try and find some

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*Adapted from an article by William J. Mills, Jr., M.D., Robert Wimley, M.D. and Winthrop Fish, M.D., Anchorage, Alaska. The article originally appeared in Alaska Medicine (March 1960, December 1960 and June, 1961 issues) and was reprinted in Navy Medical News Letter (Vol. 38, Nos. 9, 10, 11 and 12, 1961). The studies were supported in part by a contract between the Office of Naval Research and Dr. Mills.

treatment that would minimize or eliminate the severe losses commonly associated with frostbite.

The mechanism of injury in frostbite although still not clearly understood, apparently depends on at least three distinct processes. The first and most obvious is the actual disruption of cellular and tissue structure due to ice crystal formation. Associated with the ice crystal formation in some type of direct cold injury to protoplasm which is probably due in part at least, to extensive dehydration. The third type of tissue is that resulting from impaired circulation.

Method of Treatment

Fifty-one cases of frostbite were studied for a period of five years. Of these, 41 were treated directly by the senior investigator (WM) as either the attending or consulting physician. The remaining cases were drawn from files of the Alaska Native Service Hospital and Providence Hospital, Anchorage. The majority of these cases directly treated were studied by at least one of the investigators as an interested observer. Only three of the total series were not seen by any of the doctors. Hospital records for all patients were carefully perused and any pertinent information abstracted. When possible, the patients themselves were interviewed at length concerning the cause and character of their exposure and the resulting symptoms. All data which were considered of any possible value in the epidemiologic or clinical study were compiled.

Statistically, the patients were mostly between 15 and 45 years of age and were almost equally divided between Caucasians and natives—Aleuts, Eskimos and Indians. The cause of exposure were preponderantly the result of mishaps such as vehicle accidents or breakdowns, runaway dog teams, or falling through the ice wall while crossing rivers and lakes. The natives were less apt to suffer frostbite because of loss of mittens or gloves, but otherwise they were just as prone to carelessness and consequent injury as the whites. A large number of the patients suffered exposure as a result of intoxication. Several of the natives were exposed because they were rendered helpless or unconscious by attack. Three of the latter were women, who reported flight after the assault in sub zero weather without adequate clothing. Among all of the patients the feet were involved more than any other site, with the hands next. In some individuals, all four extremities were affected.

When a patient was first seen by the investigators the initial treatment consisted of rapid restitution of body temperature by a warm total bath (not always possible) and the feeding of warm liquids. Parts still frozen or cold were brought to body temperature by immersion in a water bath of 110° to 118°F, preferably in a whirlpool. This was followed by very careful cleansing of the affected part, by scrubbing it thoroughly but gently with a germicidal solution (pHisoHex®) benign to the tissue. Scrupulous care was taken to avoid trauma to the tissues and puncture of any blebs. After the involved part had been made as nearly aseptic as possible, it was placed at rest on a sterile sheet and covered with a cradle over which a second sterile sheet was arranged to prevent contamination and unnecessary contact. No dressings of any kind were used except small pledgets of sterile cotton inserted between fingers or toes to avoid maceration.

Cause of Exposure	Caucasian	Native	Total
Insidious	1	3	4
Involuntary (accidental)	18	14	32
Aircraft accident	3	2	
Land Vehicle breakdown	3		
Hunting or trapping	5	4	
Injury at work	1		
Assault	2	2	
Runaway dog team		3	
Fell through ice in river		3	
Others	4		
Alcoholic stupor	8	7	15
With assault		3	
Total	27	24	51

Whenever possible physiotherapy with whirlpool bath was begun immediately usually combined with ultrasonics The baths were given for 20 minutes once or twice daily for one or two weeks under as nearly sterile conditions as could be achieved Active motion of the affected part was encouraged from the beginning, but passive manipulation was delayed until the acute stage had subsided and danger of infection had diminished Antibiotics were utilized in the same amounts and for the same rationale as for open fractures In general the method was directed toward the restoration of normal circulation prevention of infection and ascending gangrenous change and preservation and early rehabilitation of muscle and joint function

For most of the subjects the investigators had very little control of early treatment which had varied widely depending upon where and by whom they were first seen





Fig 1. Blebs formation [illegible] shutten fingers three days after [illegible] ming

[illegible] served [illegible] ndps [illegible]



Fig. 3. Debriding action of whirlpool bath. Note dead skin peeling away.



Fig. 4. Appearance of feet after three weeks in cold and snow without boots.

This included whirlpool and physical therapy in some cases occlusive dressings in others. A few patients were treated with anticoagulants vasodilators or sympathetic block but these were too few in number to warrant statistical consideration.

Variation of Results by Method of Treatment

Thawing Methods

The data seem clearly to indicate that thawing with dry heat at high temperatures is hazardous because of the danger of raising tissue temperatures above the limit of viability especially tissues previously traumatized by excessive cold. Aside from this superficial injuries can be thawed by almost any method with apparently reasonably good results. At least no great difference in results was demonstrated in this small series other than a definite earlier return to normal sensation and appearance in the extremities rapidly rewarmed in a water bath.

For deep injuries best results were obtained with a warm water bath.* The temperature of the water actually is quite critical. It should be from 110° to 115° F. Temperatures less than 110° F. seem to be unsatisfactory and when the water gets to 120°F. it begins to be scalding. Experience indicates that rewarming in a 110° to 115°F. whirlpool bath from 20 to 40 minutes will quickly restore nearly normal colouring to the frozen member. These temperatures applied only to the initial rewarming. For the follow-up therapy—daily or twice daily whirlpool baths—the water was kept at 98° to 100° F.

This method is more painful in its initial stage resulting in an increased content of blood in the part with distention of the blood vessels and larger blebs. The pedal pulses often are "pounding" after warming and the blebs usually extend outward along the fingers or toes clear to the tips. Because of the extreme reaction, particularly the oedema and bleb formation, this is not a [illegible] therapy.

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*A recent letter from the author stated: "We have had almost as many frostbite patients this year (1961) as in the five years (1955-1960) covered by the described investigations. Over 50 per cent were re-warmed rapidly. In none of these will there be any loss greater than a portion of a digit and in the greatest majority no anatomical loss at all."

Although the results from "gradual thawing" or thawing at room temperature apparently do not differ statistically from other methods in cases of superficial injury there is obvious clinical evidence that this method yields poor results often associated with considerable tissue loss in the deep injury cases

The treatment of deep frostbite by ice ice water or snow plainly results in greater tissue loss and the method appears to have little theoretical or experimental basis to recommend it More than likely this traditional method arose from the lessened pain and discomfort during thawing particularly in superficial injury and the obviously disastrous results obtained by applying external dry heat It was probably this effect of excessive dry heat that accounted for the severe gangrenous results reported by Larrey during Napoleon's retreat from Moscow a report so often quoted in the cold injury literature that rewarming at temperatures greater than body temperature was for many years rejected and only recently received encouragement

Physiotherapy

Physiotherapy serves at least two purposes First it allows the patient to participate in the therapy Travel to the therapy area at least once a day may well be a considerable morale boost particularly for bedridden patients or those hospitalized for 30 to 150 days Also patient is able to measure his progress by gradual increase in range of motion of the digits and the return of more normal sensation Second, the use of Hexachlorophene[8] detergent in the whirlpool removes surface bacteria hastens normal physiological debridement and permits a stimulating massage of tissues Also the offensive odour so often troublesome to patients is considerably lessened Too whirlpool possibly increases local circulation and in this study it appeared to cause rapid diminution of oedema

Serial whirlpool readily relieves pain and patients tend to exercise the extremities while in whirlpool more than while lying in bed Hand exercises especially after the blebs have dried and sterile finger nets are utilized for pressure exercises (squeezing), are made easier and are more likely to be performed regularly during and after whirlpool therapy

Ultrasound was found to be both helpful and hindrance Some patients with superficial injury reported "improved" sensation and ease of interphalangeal joint motion In several in which the cold injury was assumed to be nearly symmetrical in both extremities but with only one receiving ultrasound there appeared a measureable change Increased interphalangeal joint motion and increased sensory return were marked There was observed visual evidence of an apparent increase in vascularity of fingers and toes particularly noted immediately after the use of ultrasound With deep injury there is cause to believe from sensations reported (boring pain or dull ache) and from appearance (hastened necrosis in some) that the use of ultrasound is harmful

In some cases particularly those thawed by ice and snow and a few slowly warmed at room temperature dry gangrenous tissues soon became wet after ultrasound, and liquefaction of the distal tissues was hastened In further control groups of approximate equal injury to each extremity ultrasound has demonstrated its ability to cause resolution of blebs on one extremity many days ahead of those on the opposite

untreated extremity At the third or fourth week, however no difference was generally exhibited between the extremities

Debridement

In most cases normal debridement is adequately and physiologically performed by the whirlpool. The bath's gentle motion removes eschar-scab-like dead tissue—only when it is physiologically prepared to separate

From this study it is apparent that mechanical debridement is the most harmful of all therapies for cold injury, because incision of swollen and friable tissue permits ready access for bacteria usually already present on the skin Further, debridement or amputation in the early stages (first to third week) will penetrate the œdematous tissues, which then retract exposing more bone and joint surface with further tissue loss.

Infection

Superficial infection was present in most of the cases treated patients had pockets of pus in the eschar The superficial infection appeared held in abeyance by whirlpool but it increased in many cases after debridement and without whirlpool It is presumed that the effectiveness of Hexachlorophene[8] in the bath was that of a germicidal agent. At any rate, infection was more prevalent in those cases treated with closed dressing or not receiving whirlpool bath or daily lavage Under the conditions described by these investigators, constant whirlpool followed by dry open method of dressing is the best way to prevent the rapid growth of bacteria.

For the first four years of the study the patients were placed routinely on broad-spectrum antibiotics In the last year antibiotics were utilized only after definite indication and following culture and sensitivity studies Use of antibiotics was not essential for most patients utilizing whirlpool bath but was required more frequently in patients treated otherwise

Amputation

The early appearance of the deep frozen extremity once blebs have dried is often that of black mummification extending even above the digits and involving all of the extremity's surface The over all appearance is often misleading and premature amputation must be avoided Amputation or debridement at this period (6 to 21 days) may reveal viable deep structures that would have permitted growth of new tissue under the eschar The eschar after new tissue has grown will often loosen and shed, permitting exposure of healing tissues below If amputation must be performed at the digital level most satisfactory results appear to be at the end of the 60 to 90 day period It was observed in this study that the digits will separate spontaneously requiring only revision later

If because of ascending infection, amputation must be performed at a higher level it is absolutely essential to perform a strict guillotine procedure After œdema has subsided and an adequate granular bed developed revision of the stump can follow It is interesting to note that only one patient had to be amputated following rapid rewarming as described, and that resulted in loss only of a large toe

Associated Injury

Management of the [illegible] victim may become a problem [illegible] since frost bite often is secondary to dislocation or fracture or crush injury of the extremity. These cases present combined technical difficulties other than the method of rewarming and frostbite care and as a group are deserving of more study. The approach here is similar to that of an open fracture where consideration is given first to preservation of life and limb then function and last of all cosmetic result. Despite the glibness of this approach the problem is not that simple. Much clinical investigation is required to further the treatment of fracture dislocation or soft tissue injury of the extremity with associated cold injury.

Of particular interest are the patients who become irrational or confused on the trail after freezing injury and the bed patient who after five or six days demonstrates a severe emotional reaction even developing hallucinations. Few of these patients required psychiatric care of any prolonged nature but they did require understanding tolerance of their moods patience and constant visitation and encouragement.

Conclusions

It is apparent from this study that the elimination of freezing injury is improbable, but a decrease in incidence is possible with proper prophylaxis. General knowledge of proper clothing, especially hand and foot gear, and the care and use of such gear in freezing temperatures is essential. Basic information regarding the mechanism of heat production and loss resulting from the effect of activity fatigue, sweating shivering wind exposure and wet clothing should be made available to winter travellers in the Alaskan area.

Methods of care in the event of unavoidable trauma should be taught those whose occupation or avocation permits exposure in the Arctic or Sub-Arctic. For neither here nor elsewhere has a solution been found which will nullify the effects of neglect, carelessness, alcoholic intoxication accident or assault that were the contributing causes of injury in this series.

A CLINICAL CASE OF PORCELAIN CROWNS

By Surgeon Lieutenant (D) B R OSBORN, R N

Introduction

The patient was a 20 year old Able Seaman who had slipped and broken his upper central incisors on a metal hatch cover aboard ship (Fig 1)

His past dental history was exemplary He had attended voluntarily and regularly for routine dental treatment and had been a co operative patient

He asked specifically if anything could be done with the broken teeth to avoid having to wear a denture

On Examination

His oral hygiene dental and gingival conditions were good. The upper right central incisor had a coronal fracture involving enamel and dentine only, while the upper left central incisor had a coronal fracture involving the pulp Both teeth gave a positive vitality response to ethyl chloride No root fracture or periapical abnormality was seen on radiographic examination

Treatment Plan

(a) *Immediate* Treat right upper central incisor with topical application of silver nitrate and oil of cloves on the exposed dentine to seal off the tubules and minimize sensitivity Root fill left upper central incisor

(b) *Subsequent* Right upper central—porcelain jacket crown Left upper central porcelain jacket crown fitted over a cast gold post and core (Fig 2)



Fig 1 The patient's teeth

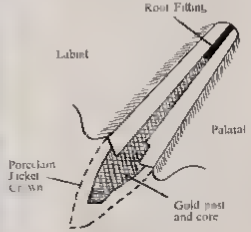


Fig 2 Porcelain crown with cast gold post and core Left upper central



Fig 3 Preparations—labial view

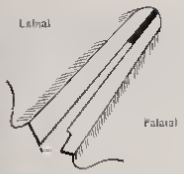


Fig 4 Post-crown preparation Left upper central

Method

(1) *Root Filling* (Fig 3)

Under local anaesthesia the pulp was extirpated from left upper central and the root canal enlarged and reamed to size nine reamer The root canal was then irrigated with hydrogen peroxide and dried

As the patient was seen within a few hours of the injury it was decided to root fill the tooth immediately A size ten Gutta Percha point was selected and checked for fit with the aid of radiographs It was then cemented into position A temporary filling of zinc cement sealed off the coronal end of the root canal

(2) *Preparation of the teeth to receive crowns*

(a) *Post Crown Left Upper Central* One month later the root filling was found to be clinically and radiographically satisfactory The bulk of the upper left central incisor was cut down using an air turbine drill

Labially the preparation was taken down below the gingival margin using a small slowly rotating wheel stone Palatally the preparation was taken to the level of the gingival margin

The palatal and labial planes were cut in such a way as to make the preparation "tent" shaped with the ridge mesio distally across the central canal

The root canal was enlarged with a tapered fissure bur to take the gold post The face of the preparation was notched on the palatal side of the root canal to assist location and to counteract any rotational forces to which the crown might be subjected (Figs 3 and 4)

(b) *Jacket Crown* (Figs 3 and 5)

The upper right central incisor was prepared according to the principles of Conod (1937) and Tylman (1954)

Under local anaesthesia the incisal edge was reduced about two mm with a water cooled carborundum stone and bevelled palatally at 45 degrees

Interstitually the tooth was reduced using a water-cooled safe-side diamond disc

Palatal enamel was removed with a wheel stone and the labial enamel was removed using a long tapered fissure bur in an air turbine handpiece

The same long tapered fissnre bur was nsed to ronnd off the preparation and to make the mtinal gingival shonlder

The shoulder was finally sharpened and squared using a new No 3 steel flat fissnre bnr rotating slowly The shonlder was approximately two mm in width and followed ronnd the tooth two mm below the level and contonr of the gingival snlcus

The preparation was tested for undercuts using gutta percha When it was satis factory it was polished using a fine cuttle dise

(3) *Impressions*

Two tightly fitting copper rings were trimmed to fit gingivally over the preparations and were boldly notched anteriorly They were not annealed so as to give maxi mnm snpport to the impressions

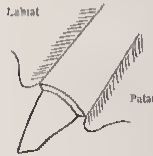


Fig 5 Jacket crown preparation Right upper central



Fig 6 Finished crown fitted

The preparations were lightly lubricated with engine oil and greenstick compound impressions were taken in the copper rings To strengthen the impression of the root canal for the post crown a hot piece of thick wire was pnshed into the wax in the canal as the impression was being taken

The operator prefers to use greenstick compound and copper rings for impressions of the preparations because he finds it easier to get good snb gingival definition than with silicone and rubber base materials which tend to be deceptive because of their elasticity

When good impressions had been obtained all snrplus greenstick componnd was removed from the ring The labial notches were extended boldly into the ad jacent componnd to assist positive location in the laboratory The preparations were oiled again and the impressions re inserted into position An over all impres sion was taken in 'Verone' The copper rings were removed in the impression as it was withdrawn A full lower impression was taken in "Panbar

The impressions were then despatched to the laboratory together with information about the shade of the teeth

(4) *Temporary Crowns*

Temporary crowns were made from Orthofil in cellulose acetate crown forms A pre formed stock post was used for the temporary post crown The temporary crowns were cemented with zinc oxide and oil of cloves

(5) *Fitting the Crowns*

All traces of the zinc oxide which cemented the temporary crowns were removed and the preparations were dried thoroughly The gold post was tried in and when satisfactory cemented using zinc cement The post was not polished No diaphragm was thought to be necessary owing to the high tissue tolerance of porcelain and the anti-rotational design of the preparation When the cement was set care was taken to remove all traces of excess from the face of the preparation and the crowns were tried in Fit shade mould and occlusion were checked

The yellow colour of the gold core appreciably affected the shade of the post crown owing to the translucency of the porcelain

The core was whitened by painting it with a thin layer of a mixture of clear coldcure acrylic and zinc oxide The remaining slight discrepancy in colour was offset by using a dark shade of cement when fixing the crown Where there was a very slight contact palatally on the crowns, the glazed surface was roughened slightly with a carborundum so that the crown would lightly abrade the opposing tooth and prevent overerruption

SUMMARY

The treatment of two traumatized central incisors is described Factors leading up to the choice of treatment are discussed Preparation impression and fitting techniques for a porcelain jacket crown, and a porcelain crown with a gold post are described

ACKNOWLEDGMENTS

My thanks are due to Mr J Steers and Mr C Wooder of the Dental Laboratory, R.N Barracks, Portsmouth Lieutenant Barnes and Petty Officer Fisher of the Photographic Department H M S *Centaur*, for photographic illustrations and Sick Berth Petty Officer G Taylor for chair-side and clerical assistance

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ROYAL SOCIETY OF HEALTH EXHIBITION, EASTBOURNE, 1963

The Naval Medical Contribution

With the official report of the Wilson Committee on the Problem of Noise about to be published and the Noise Abatement Act of 1960 in ever increasing use noise was chosen as the subject of the naval exhibit. Indeed one whole session of the Congress was devoted by the Association of Medical Officers of Health to a Symposium on Noise.

An overall impression of the stand can be gained from the photograph below, taken during the visit of the Mayor of Eastbourne Councillor Cecil F. Baker J.P. himself an ex R.N.V.R. man. Its centrepiece was a collection of pictures showing the principal noise hazards in the Royal Navy and Royal Marines and the posters used for display in noise-hazardous situations. With these was some descriptive material pointing out the fundamental similarity between service and civil noises and a comparison of sound levels reached in situations typical of both. Also on the table were a selection of instruments for measuring hearing and noise levels and of



equipment for ear protection and control in noise. Available, but not displayed in order to avoid overcrowding, were graphical displays of the main results of recent naval research into the effects of [illegible] of the various noises depicted.

On the two side walls of the stand were grouped pictures and graphs illustrating the following additional aspects of work carried out on noise in which the Navy is interested:

(i) Method and results of measurements of sound field around the new self loading rifle.

(ii) The design and constructional detail of the R.N. mobile audiometric test unit (see descriptive article in the previous number of this Journal) which was itself parked in the exhibition grounds. This was visited by a large number of delegates to the congress many of whom were offered and accepted an audiometric test of their hearing.

(iii) The protective action of the acoustic reflex (attained by noise induced or anticipatory contraction of the stapedius and tensor tympani muscles).

(iv) The experimental attenuation of pure-tones and the actual protective effect of various ear plugs and ear muffs.

(v) The effect of noise on task performance.

The staff of the naval exhibit consisted of Surgeon Lieutenant Commander R. R. A. Coles (R.N. Medical School) in charge, Surgeon Lieutenant Commander M. K. Mead (Wessex Division R.N.R.) and Miss J. Thompson, Head N.N.A. (R.N. Medical School) on the stand and Sick Berth Attendant L. Martin (Central Air Medical Board) in the trailer and operating its audiometer. To back them up in their many discussions of medical, dental and nursing careers in the Navy a comprehensive selection of the relevant descriptive pamphlets was also available.

It is difficult to define precisely either the objects of naval medical participation in the exhibition or the results achieved. But judging from both the number of visitors and by their questions and comments and from the official and Press reaction, there can be no doubt that it gave a worthwhile demonstration of one of the many spheres of research and preventive medicine in which the Royal Naval Medical Service is actively engaged.

Moreover much goodwill appeared to have been created simply by participating in an otherwise largely commercial exhibition—a not inconsiderable bonus in the form of public relations which ultimately may well be repaid in terms of medical recruitment. Finally, a number of most useful contacts were made with other members of the medical profession particularly interested in the subject of noise.

Reviews

MI[illegible] RESEARCH. Edited by P Sainsbury, [illegible] Oxford: Pergamon Press. Price 35s

This small book was designed to discuss the basic approach to and the methods used in Psychiatric Research. The book contains some 14 separate papers prepared by workers who are authorities in the fields in which they write.

The subjects covered range from the choosing of the subject for clinical research to the final writing of the paper. Methods of research are considered in detail: the uses of clinical records in retrospective research are discussed: the evaluation of results and the statistical significance of these figures form both chapters. There is even a chapter devoted to Applying for a Grant and Administering Research.

The book as a whole can be regarded as a complete guide to the Clinical Psychiatrist who wishes to organise his everyday work and experience in such a way that he can pursue both his clinical duties and research at the same time.

It is a book which can be strongly recommended to all who are engaged in clinical practice. They will be stimulated by it to think in terms beyond the everyday care of patients.

W C

LIVING ANATOMY. By R. D. Lockhart, M.D., Ch.M. Sixth Edition. Pp. 91, 215 Figs. London: Faber & Faber. Price 18s.

The present or sixth edition of this remarkable book illustrates its popularity and includes a further 25 illustrations. This new technique in teaching anatomy brings to the student a true conception of the living body than can be found in conventional instruction. The skill of the author is shown by his choice of subjects and ability to position them to outline individual muscles and muscle groups.

The volume is almost exclusively compiled of photographs both of men and of women with very little artificial aid.

Muscles are made to work against resistances and gravity to bring out their contours.

This delightfully refreshing book can be conscientiously recommended to all students of anatomy and those who appreciate the human mechanism.

S. M.

PRACTICAL MALARIOLOGY. By P. F. Russell, L. S. Wolf, R. D. Manwell and G. MacDonald. Second Edition. Pp. xv + 750. Some colour plates and black and white photographs. London: Oxford University Press. Price 84s.

Malaria still one of the world's most devastating diseases fully deserves a volume such as this which differs from the conventional text-book treatment, presenting the subject in an interesting and well balanced manner. The early history is particularly well written and forms a very good opening for the subsequent parts.

The malarial parasite is described in detail and its cycle as found in both the human and animal carrier. A valuable section on techniques used in its examination completes the first part.

Part 2 gives a comprehensive list of the appropriate details of the mosquitoes concerned in the transmission of the paras ite with careful geographical tabulation. This part similarly concludes with the practical instruction necessary to be competent in this field and the use of the punch-card system in recording data is very welcome.

Part 3 is devoted to the individual problems including the pathology, clinical aspects and treatment. The first two of these receive adequate though not excessive consideration whilst treatment is up to date and comprehensive. This concludes with chapters on immunity and blank water fever.

Part 4 is perhaps the most important section dealing with the problem as it affects the community. This concludes with a series of appendices giving keys to anopheline mosquitoes in different parts of the world which can be used for their identification. A very convenient arrangement in the separation of the indexes of the subjects and organizations and places. The book is essentially one for reference. It is well illustrated and compiled in such a manner as to facilitate easy enquiry into particular facets of the subject.

S. M.

FOOTPRINTS ON THE SANDS OF TIME 1863-1963. The Story of the House of Livingstone. Medical Books published by E. & S. Livingstone Ltd.

Text books, reference books, examination books and Journals all with a medical theme and the crest of a lion rampant carrying a standard are familiar to doctors, dentists, nurses and medical auxiliaries. The special edition of the catalogue lists the current volumes and the number and variety of these demonstrate the reason for this found unity. Over 400 titles are listed with the books arranged by author rather than subject and the specialist journals forming a special section of their own. Such an arrangement means that any individual will find a volume of interest almost wherever he opens the catalogue. An interesting section to remind medical men of their heritage is the one on history and biography where imprints of some of the landmarks of the 17th, 18th and 19th centuries on matters relating to medicine or by the medico scientist are listed. The short Journal of the history of the firm of E. & S. Livingstone attempts to give some idea of the development of the company so that an

impression is given of an alert group of individuals aware of the standards evolved over the past century yet determined to continue to supply an essential service for all branches of medicine at as good a standard if not better for the next 100 years. All of us can say to the firm, Thank you for your past, best wishes for your future.

D E M

BIOLOGICAL STAINING METHODS. By GEORGE T GURR. [R I C] Seventh Edition 116 pages London G T Gurr Ltd Price 6s

This most recent edition attractively bound and useful as a book for bench use omits some of the procedures which have fallen into disuse and includes many newer methods and formulæ

A great deal of the ground is covered in a book of moderate size and should prove invaluable for use on the bench of any medical or biological laboratory

Consisting of eight sections, 81 pages are devoted to staining methods and a formulary of over 170 stains and reagents presents a volume of information for the practical microscopist

Sections deal with staining methods for micro organisms and the use of the Romanowsky and other stains for haematological procedures while in sections on general methods there is a wide selection of histological techniques

Notes on histological embedding materials contain useful information dealing with the use of various types of waxes for infiltration and embedding and factors governing the choice of mounting media for histological purposes

The influence of pH on staining is dealt with the need of stains and the art of preparing a really good microscopic picture.

A useful appendix gives rapid methods of calculation and conversion, a list of chemical incompatibilities and corrected refractive indices of materials used in microscopy

Over 30 years has elapsed since the initial appearance of this publication and the new edition produced with the author's 40 years experience in the production and standardisation of stains is a book primarily for the technologist but most useful for all concerned with microscopical staining.

W J D

MEDICINE AND THE NAVY 1200-1900 Vol IV 1815 1900 By Christopher Lloyd and J L S Coulter Pp xi—203 Illustrated London and Edinburgh E & S Livingstone Ltd From 50s. + 2s 6d home postage

Professor Christopher Lloyd and Surgeon Captain J L S Coulter, R N (Rtd) have combined to present an authoritative interesting and extremely well written presentation of Medicine in the Navy from 1815 to 1900. This period is of particular interest as it shows the developing pattern from which the Medical Service of today has evolved. The heartaches which faced the Senior Medical Officers of that time are not uncommon to those of the present time and encouragement may be gained from the patient perseverance of those in responsible positions during this time

History generally speaking can be rather dull but the authors have succeeded in bringing it very much to life and the reader feels that he is present during many of the deliberations and struggles that are described

Those of us who today may feel frustrated by lack of progress may be encouraged by thinking not in terms of a career of 50 years but of a period of 700. Reviewed in such a context definite progress becomes obvious.

The meat of this history is repeatedly punctuated by refreshing anecdotes and incidents which give the reader to the text

This volume most certainly maintains the high standard of its predecessors it is a joy to read and of great historical value

S M

HALE WHITE'S MATERIA MEDICA PHARMACOLOGY AND THERAPEUTICS. By A H Douthwaite M D F R C P Consulting Physician to Guy's Hospital Thirty-second Edition Pp 519 London J & A Churchill Ltd. Price 27s 6d

This valuable little book on drugs their actions and therapeutic uses has now appeared in its 32nd edition 71 years after its first appearance with Dr Hale-White as the editor. It can still be considered the medical practitioner's primary authority on this subject and it is available at a bargain price of 27s 6d with over 500 pages packed with essential knowledge

In this last edition there has been a complete revision of the text necessitated by fresh developments in the fields of synthetic drugs antibiotics pharmacological knowledge and the advance of rational therapeutics

The older practitioners will miss the Imperial System of weights and measures and no longer can one find the dose of phenobarbitone as ½-2 grs but replaced by the Metric equivalent of 30 120 mgms or alternatively pentobarbitone sodium (Nembutal) with a dosage of 0 1-0 2 Gm and without the Imperial equivalent in brackets to follow Latin titles have also been omitted and the B P preparation of liquorice now appears as "Liquorice Liquid Extract" as opposed to Ext Glycyrrhizæ Liq with the well known Paraffin Molle being just plain White or Yellow Soft Paraffin or Petroleum Jelly And changes indeed! But obviously changes that move with the times!

Modern drugs are well described with detailed accounts of the actions and therapeutics of brethylium guanethidine and methyldopa in the field of hypertension, or alternatively many of the

This work then [illegible] the older [illegible] rational [illegible] used in the section on the [illegible] drugs with excellent chapters [illegible] anticoagulants and chemotherapeutic agents, etc., to mention but a few [illegible].

This book can be highly recommended [illegible] all branches of the profession and from the detailed [illegible] together with that in the British National Formulary and the Monthly Index of Medical Specialities (MIMS) of Medical Publications Ltd., regarding proprietary preparations [illegible] should be faced with no problems in the correct prescription of the multiplicity of modern drugs. L G T

EXPOSURE OF MAN TO RADIATION IN NUCLEAR WARFARE. Edited by John H. Rust and D. W. Mewissen. Pp. [illegible] 155. Barking: Elsevier Publishing Company Ltd. Price 15s.

Following the general pattern of books in the field of ionizing radiations, we are again presented with the collected papers from a symposium. On this occasion these comprise the lectures given to the NATO Civil Defence Committee's Scientific Working Party in 1965. They deal with an assessment of the effects on man of acute exposure to ionizing radiation, including both immediate and long term effects in the individual and the genetic consequences.

Although these estimates are of the first importance to those who must make the decisions, they must be based on work in the field of radiobiological research and therefore upon incomplete results. It follows that they depend upon informed opinion and the reliability of this book is that of the judgment of the authors. The writers of the papers are in fact all well established in the field of radiobiology and their opinions are the results of years of experience. Nevertheless they can be challenged and not the least value of the book is in the discussion following each paper, for these discussions show clearly the areas of doubt.

The book is necessarily mainly of importance to those concerned with civil defence or the public health aspects of radioactivity. Because of the widespread use of radiation and radioactive substances it would be read with benefit by any medical practitioner, provided that it is noted that the book is by its nature limited to the discussion of a few aspects of the whole problem. T L F

PRACTICAL NOTES ON NURSING PROCEDURES. By Jessie D. Britten, S.R.N. Fourth Edition. Pp. viii + 200. 171 Illustrations. Edinburgh & London: E. & S. Livingstone Ltd. Price 15s. 1s. 1d. postage.

The past editions of this book received an excellent reception and it is safe to predict that this fourth edition will do as well or better because it does fill a need. In revising this book the author has successfully brought it up to date in the hope that it will continue to be of value to the student nurse. This I am certain she has achieved in its absorbing pages made all the more readable by the use of clear and numerous line drawings. Written primarily with the student nurse in mind it is intended as a basis for the preparation of the General Nursing Council's examinations. It commences with a brief and lucid account of the history of nursing and the hospital as a unit. This is then followed by chapters on the basic nursing procedures. It is an attractively bound book which has been well produced to withstand continual use by its owners. It is printed in clear type and the subject is presented in an interesting manner. This book cannot, indeed is not, intended to replace the already numerous text books on its subject, but it will surely be regarded by all nurses as a useful addition to the bookshelf and is strongly recommended to all who are engaged in nursing the sick. G W

FOUNDATIONS OF NURSING. By Janet S. Ross, R.G.N., R.F.N., and Kathleen J. W. Wilson, B.Sc., R.G.N., S.C.M. Third Edition. Pp. viii + 302. Profusely illustrated with 108 line drawings. Edinburgh & London: E. & S. Livingstone Ltd. Price 21s. 1s. 3d. postage.

In an ever-changing profession there is always a demand for new and up to date literature. If we are to expect the nurses of the future to maintain their already high standard we must provide them with text books of that same quality. It is therefore a welcome third edition that the authors have produced, enhanced by the many line drawings which the youngest probationer nurse will find easy to understand. Useful additions to the second edition include a chapter on the testing of urine and a section on administering intramuscular injections. The sections on sterilization and disinfection including the principles of a Central Sterile Supply Service have been completely revised. So too has the section dealing with the method and materials used in ward dressings and the introduction of disposable materials. The third edition of this reference book has all the qualities, and more, of the previous editions. It aims, as is stated in the preface, to give the student nurse basic knowledge on which to build her future experience. It will also serve to refresh the memory of the trained nurse preparing for higher qualifications. The great asset of this book is that, full of valuable information that it is, it is not too dogmatic and while providing the basic principles it does allow these to be adapted to suit the individual requirements of wards and hospitals. G W

ILLUSTRATED HANDBOOK OF LIFE SAVING INSTRUCTION. Pp. vi + 176. The Royal Life Saving Society, Desborough House, 14 Devonshire St., Portland Place, London W.1. Price 4s. 6d.

This new illustrated handbook of the Royal Life Saving Society is up to date, clearly written and presented in a form which gives important information in an easily available manner.

This Society's prime interest is in saving lives from drowning and teaching techniques of rescue

[illegible] chapter [illegible] result of [illegible] in the presentation [illegible] and [illegible] described. A [illegible] paragraph on [illegible] and [illegible]

[illegible] oxygen [illegible] shock [illegible] presentation by the expert [illegible] methods and [illegible] The rest of the column is [illegible] of the Society [illegible]

BIOCHEMICAL VALUES [illegible] By R. D. Eastham, B.A., M.D. [illegible] Second Edition [illegible] John Wright & Sons Ltd. Price 15s.

This pocket book [illegible] than a list of so-called "normal values" and [illegible] chemical pathology.

The preface contains an excellent advice on the use of chemical investigations [illegible] and certainly discussion between the clinician and the clinical biochemist [illegible] in specific cases. Such discussion is a good deal easier in the Naval Service [illegible] central laboratory serves many hospitals, but such counsel is worth emphasizing.

The factual matter in the book is comprehensive and references [illegible] ments and values but a [illegible] the [illegible] laboratory [illegible] ment of the book is rather unsatisfactory. The subjects are arranged alphabetically [illegible] titles, to Zinc sulphate turbidity, mainly by the titles of the tests. [illegible] occasionally absurdity such as "Cephalin Cholesterol in serum". The [illegible] patient will need a specific case—though if he already knows the name of the [illegible] example [illegible] are dealt with on pages 19–22 [illegible] In passing it is odd to read "The clinical significance of this ratio has not yet been [illegible] in reference to the quantities of "Direct and indirect reacting bilirubin [illegible] kernicterus. Acid-base problems are dealt with under "Alkali reserve" on page [illegible] in blood" on page 28 and "pH in plasma" on page 81. There is [illegible] These defects would be partly overcome by cross-indexing e.g. under "Liver function [illegible] Renal function tests", "Acid-base regulation", etc., but the existing short index is [illegible] of the alphabetical arrangement of the book and not very useful.

There is a splendid section on proteins, presumably reflecting the author's [illegible]

I have found this a useful book of quick reference in the laboratory and [illegible] whom I have asked to use it find it helpful in interpreting laboratory reports rather than [illegible] a programme of investigation. Any such work of compilation is bound to be open to criticism by its nature since selection, nomination and summary impose a great load on the writer and such criticism does not detract from its value in its chosen limits.

In the words of the preface, "If this book succeeds only to interest some people into a state of greater interest in clinical chemistry, then it will have performed a useful function". D. O. H.

ELECTROCARDIOGRAPHY. By Richard W. D. Turner, O.B.E., M.A., M.D., F.R.C.P., F.R.C.P.E. First Edition. Pp. viii + 155. 17 illustrations. Edinburgh and London: E. & S. Livingstone Ltd. Price 20s. 1s. postage.

This small volume contains the series of 12 articles on "Clinical Electrocardiography in General Practice" published in *The Practitioner* during 1967 together with additional electrocardiograms and a valuable final chapter stressing the various points made in the book. There are also useful appendices indicating the range of normal limits of the various deflections in children and adults, the method of measurement of axis deviation, a nomogram for the corrected QT interval and a table for the rapid calculation of the heart rate from the electrocardiogram.

Dr. Turner must be congratulated on this concise, didactic work with its excellent illustrations. It was never intended to be exhaustive, yet the houseman will find it an authoritative guide which he will keep on the E.C.G. trolley for quick reference. For only 20s. he will make a good investment. J. M. C.

RADIOISOTOPE RENOGRAPHY. By Chester C. Winter, M.D., F.A.C.S. Pp. xx + 184. 144 figures. London: Baillière, Tindall & Cox Ltd. Price 72s. 3s. postage.

In this short book the author traces the development of renal function studies using radioactive tracers. The author was one of the originators of the method in 1955 and takes pains to apologize for the unsound derivation of the term Renography.

The skill of the author lies in the way in which he describes the difficulties which had to be overcome, the advantages and future applications of the method. This is done in logical steps and in a language which could so easily have been confusing had a too detailed knowledge of physics been expected of the reader.

The greatest advance of the method is perhaps that simultaneous tracings are obtained throughout

the excretion of the radioactive material by both kidneys against a considerable time base. The renogram can be interpreted in the minutes in most cases. From the patient's point of view this method is both comfortable and safe. There is no requirement for repeated blood samples and bilateral ureteral catheterisation. The examination may be repeated to assess progress. The drawbacks amount of the most of the scanning equipment, accuracy in localizing the kidneys and precision of injection of the radioisotope. These disadvantages are gradually being overcome.

F. A. F. M.

Illustrated Physiology. By Ann B. McNaught, M.B., Ch.B., Ph.D., M.I.Biol., and Robin Callender, F.F.Ph. Pp. viii + 787. Edinburgh and London: E. & S. Livingstone Ltd. Price 30s. + 2s. 3d. postage.

This book, which comes from the Department of Physiology of Glasgow University, is a departure from traditional text books in that it represents a new approach to the systematic teaching of the subject.

It consists essentially of a series of diagrammatic illustrations, with written commentary covering the main topics of human physiology such as might be used by a lecturer presenting them to a class.

Such outlines could be useful for several classes of reader: all beginners would find them helpful as a general introduction to the subject; nurses and those other than medical students who, however, need a basic knowledge of the subject, would find it here in an interesting and easily understood form. First year medical students might appreciate it for revision purposes and to second year students it would afford a system of outlines which could then be supplemented by further reading.

It is well presented: the illustrations and diagrams are clear and informative and it is good value at the price.

J. J. B.

A Handbook of Radiography. By John A. Ross and R. W. Galloway. Third Edition. Pp. viii + 220. 109 illustrations. London: H. K. Lewis & Co. Ltd. Price 32s. 6d.

This is the third edition of this small book. At the time when the first edition was published (1940) there were few other text books of its kind. Since the first edition the syllabus for membership of the Society of Radiographers has increased in scope and complexity. The new edition covers the recent changes in the syllabus.

The authors have obviously aimed to produce a book of pocket size, which can easily be read in the train or elsewhere, when the opportunity presents itself. Then the cover and the size of the book very much. The limitation of the book is that, in an attempt to cover every part of the curriculum, some subjects have to be treated in a rather sketchy manner. The book succeeds best in such chapters as Neuroradiology, where the information is difficult to obtain elsewhere.

The book provides a good introduction to a subject in which some of the text books equal this family Bible in bulk.

F. A. F. M.

Food Hygiene Ashore and Afloat. By C. P. Collins, *D.S.C.*, M.D., D.P.H., Surgeon Captain, R.N. Pp. viii + 149. London: Putman Medical Publishing Co. Ltd. Price 27s. 6d.

Surgeon Captain Collins presents a mass of useful information in a relatively small book. Hints and recommendations are amply recorded under adequate headings. The first four chapters introduce the basic principles of nutrition, personal idiosyncrasies and the major hazards of food contamination.

Chapters 6 to 12 inclusive, though headed "Inspection" of various foods—meat, game, eggs, fish, vegetables, fruit and canned foods—go further and give useful advice on preservation, storage and preparation. Eggs receive special consideration with warnings about cleaning and conservation, though the average reader will be left in doubt as to what is gas storage. Milk is similarly covered with comment on the subtle difference between "safe" and "clean" milk. Ice cream, with its increasing sales, receives worthwhile comment.

Storage, Refrigeration, Cooking, Serving and Premises are given important and sound attention. Washing up has a chapter to itself with emphasis on the importance of rinsing and risks of wiping.

Refuse Disposal, too, is fully described though there is scant reference to the newer methods using disintegrators or bins with disposable liners. The insistence on immaculate refuse collection on Saturdays may be asking too much.

The last two chapters on Rodents and Insects complete the overall picture with the minute thoroughness which is typical of the whole publication.

The author claims to be writing primarily for the professional food handler but "Food Hygiene" is well worth a place amongst the cookery books in the housewife's kitchen.

S. M.

Aspects of Psychotherapy. By J. Atkin, M.D., D.P.M. Pp. viii + 103. London and Edinburgh: E. & S. Livingstone Ltd. Price 10s. 6d.

This is a small volume which contains a series of some 14 short essays and poems in which Dr. Atkin ranges over a wide field and considers psychotherapy in its many aspects.

He writes in a manner which clearly demonstrates his wide experience and knowledge of his subject. He is never didactic or dogmatic yet his writing has a ring of authority which obviously springs from his own confidence in the value of this method of the treatment of patients. He discusses subjects which range from the Essentials of Psychotherapy to Art Therapy and the Assessment of Recovery Rates in Schizophrenia. He is easily read. One does not hide behind the technical terms which

writers on the field so effectively and he presents very full accounts of physiology, pathology, and practical planning. He draws upon his own extensive experience in therapy to illustrate in a wide application the subject.

All in all, this book is a most satisfying and up-to-date introduction to a subject which is of great importance to many people who think that the illness be organic or functional.

W. C.

CARDIAC ARREST AND RESUSCITATION. By P. M. Milstein, M.B., B.S. (Lond.), F.R.C.S. (Eng.). Pp. xv + 231. Black and white photographs and line drawings. London: Lloyd-Luke (Medical Books) Ltd. Price 35s.

At a time when the medical profession as a whole is becoming more concerned with the treatment of cardiac arrest, especially in cases of accidental asphyxia, a book such as this, which gives the merit of the whole problem is exceptionally welcome. The sense of urgency which this form of treatment demands is very well emphasized and to quote the author: "The high mortality of cardiac arrest is almost entirely due to delay and inadequate treatment, although nearly every person with a normal heart and lungs can be successfully resuscitated. In most cases, the heart can be immediately restored. Death usually results from cerebral damage because the proper treatment has not been applied within the vital three minutes." This is a timely warning and although the three minute interval is a rather dogmatic statement it is an emphatic warning. Techniques of hypothermia which are now used may well produce a good recovery even when this interval is exceeded.

The book opens with an interesting historical review and gives a clear outline in subsequent chapters which are arranged to deal with pathology and aetiology, prevention, diagnosis and treatment. The latest techniques are well described and the physiology is sound.

The only criticism in this respect is that more emphasis might have been placed upon the value of closed chest cardiac massage. A useful chapter on special cases concludes the work, though in comments on drowning a statement that ventricular fibrillation occurs in fresh water drowning might well be challenged, especially as Fuller in a recent contribution to the American Journal of Military Medicine has failed to note the occurrence of this in a study of 3,000 cases. The recommended use of a pulse monitor in all cases undergoing general anaesthesia is also open to question. Apart from these criticisms which are not serious, the book is strongly recommended to physiologists and physicians alike.

S. M.

INJURIES OF THE KNEE JOINT. By J. S. Smillie, *O.B.E.*, Ch.M., F.R.C.S. (Edin.), F.R.F.P.S. Third Edition. Pp. x + 536. Many black and white and coloured illustrations. Edinburgh and London: E. & S. Livingstone Ltd. Price 90s. 2s. 9d. Home Postage.

This is the third edition of this book to appear in 16 years and during this time it has certainly become the standard work of reference on disorders of the knee. This is a tribute to Mr. Smillie's industry for the text is largely rewritten providing opportunity for change to rectify statements recognized as erroneous.

This industry is by no means confined to writing for the wisdom affirmed is based on his personal experiences. In the section on meniscus injuries, drawn from personal records of a series of 5,000 meniscectomies.

In the Navy as many as a quarter of the Orthopaedic cases under care may own one are afflictions of the knee. The whole range of such conditions is dealt with in detail except perhaps chondromalacia patellae which remains a difficult problem in the Service.

This volume is beautifully produced. In particular the layout is admirably clear for quick reference and there is a very good index. The illustrations are most generous and of a uniformly excellent standard with many in colour.

In summary, this is an excellent book, but one designed for the Orthopaedic surgeon or as a reference rather than for general reading.

K. T. H.

We acknowledge with thanks receipt of the following publications:

Acta Medica et Biologica. Annales Medicinae Internae Fenniae. Annals of Tropical Medicine and Parasitology. Australian Journal of Experimental Biology and Medical Science. Bulletin Medical. Journal. British Journal of Surgery. Practice. B.S.I. News. British Medical Bulletin. Bulletin of the World Health Organization. Bulletin of Tokyo Medical and Dental University. Fukushima Journal of Medical Science. Gunma Journal of Medical Sciences. Guy's Hospital Gazette. Indian Journal. Review of the Army, Navy and Air Force Medical Services. Japanese Journal of Medical Science. Journal of the RN Scientific Service. Journal of the Arab Medical Association. Journal of the Royal Army Medical Corps. La Medicina Cosmo-Sinodale en Afrique. La Médecine de Rescate. Medical Digest. Medical Journal of Osaka University. Militaire Medische Negerachtenen. Journal of Medical Science. Proceedings of the Staff Meetings of The Mayo Clinic. Revista de Medicina Aeronautica Espanola. Revista Iberoamericana Medicina Tropical. Sao Paulo. Shinshuko Tokushima Igakkai shi. St. Mary's Hospital Gazette. St. Thomas's Hospital Gazette. The Australian and New Zealand Journal of Surgery. The Tohoku Journal of Experimental Medicine. The Annamite Medical Journal. The Journal of the American Medical Association. Tropical Diseases Bulletin. Ulster Medical Journal. Vestnik dermatologii i venerologii. WHO Chronicle. Yonago Acta Medica.

News of the Service

OBITUARIES

Surgeon Commander J L DAVENPORT died on the 24th September 1963 at the age of 58 years

Surgeon Commander Davenport qualified M R C S and L R C P and entered the Royal Naval Medical Service on 16th October 1933 as a Surgeon Lieutenant He was promoted to Surgeon Lieutenant Commander on 16th April 1939 and to Surgeon Commander on 16th April 1951 He was placed on the Retired List (Age) on 14th October 1960

Surgeon Commander A H S RICHARDSON died on 6th August 1963 at the age of 87 years

Surgeon Commander Richardson qualified M R C S and L R C P in 1902. He entered the Royal Naval Medical Service on 23rd November 1903 as a Surgeon Lieutenant, was promoted to Surgeon Lieutenant Commander on 23rd November 1911 and to Surgeon Commander on 1st March 1917 He was placed on the Retired List (Age) on 2nd April 1928

HIGHER QUALIFICATIONS

Surgeon Lieutenant Commander T P Oliver D P H July 1963
Surgeon Lieutenant P J Tinsdale D P H July 1963

CONSULTANT APPOINTMENTS

Surgeon Captain P W Edmondson M R C S L R C P D C P Consultant in Pathology
Surgeon Commander W Cullen M D Ch F Consultant in Neuro-Psychiatry
Surgeon Commander G S Irvinn M B B S M R C S L R C P D L O Consultant in E N T
Surgeon Commander A D Connor M B B S M R C S L R C P F F A R C S Consultant in Anesthetics
Surgeon Commander R W B Scott M B B S M R C P Consultant in Dermatology

PROMOTIONS

To Surgeon Lieutenant Commanders J J Brand M B B S M R C S L R C P D A Lammiman M B B S D Obst R C O G D A P G Bond M B B S F R Wilkes M B Ch B M R C S L R C P
To Surgeon Lieutenant Commander (D) W T G Phillipps L D S.
To Acting Surgeon Lieutenants C M Mackin M B Ch B N E Hadley M B B S and M F Ingledon M B Ch B

NEW ENTRIES

Surgeon Lieutenants D T Mansin M B B Ch M R C S L R C P M P W B Paine M B. B S B M Adams M B B Ch F A O Miss Valerie Mary Marvin M B B S L R C P P L Golding M B B S M R C S L R C P D G Wingent B A M B B Ch B A O
Surgeon Lieutenants (D) I N Gaiside, B D S. L D S R C S (Eng) J C Ferrer B D S A J Rigg Gunn L D S R C S M J Swann, B D S. D R A Lloyd Edwards L D S, R C S N J Stimson L D S J N Cran B Ch L D S
Surgeon Sub-Lieutenants P R S Snowden K M Heaton B D Kirkpatrick S McHugh F E Willmott D I Wise E S Gnome J R Harrison T J Hepburn A J R McDonald W M A Nobbs P J M Utwin C J Brooks M J Hopkins K G Smith G R Angell C T Hewetson and K H Hunt
Surgeon Sub-Lieutenants (D) T R C Cheesman M M Perrin R B Clark D R A Little and J V Holland

RE-ENTRIES

Surgeon Lieutenant-Commander R Radford B Sc M B B S M R C S L R C P

TRANSFERS TO THE PERMANENT LIST

Surgeon Lieutenant Commander K J Martin M D. B Ch
Surgeon Lieutenants D B Watkin M B. B Ch and D E Day M B B S M R C S L R C P D A

SHORT SERVICE COMMISSION (CONVERTED TO ONE OF FIVE YEARS)

Surgeon Lieutenant Commander P P M Brown, M R C S, L R C P, D P H
Surgeon Lieutenants J A M Wright, M B, B Ch, B A O, R I Cole, M B, B S, D Obst, R C O G, D A, J K Campbell, M D, Ch B, D W Sykes, M B, Ch B, M G Askew, M B, B S, M R C S, L R C P, J G Connolly, M B, B S
Surgeon Lieutenants (D) G K Keeble, B D S, L D S, M W Binks, L D S, R C S, P L Cooper, B D S, E J Grant, B D S, L D S

RETIREMENTS

Surgeon Captain A E Hinnigan, Placed on Retired List (Age)
Surgeon Captain P W Edmondson (Own Request)
Surgeon Captain W B Taylor, L R C P, L R C S, L D S (Age)
Surgeon Captain (D) J C Stenson (Age)
Surgeon Commander W A Brunen, O B E, M R C S, L R C P (age).
Surgeon Commander J C Wyatt (Own Request)
Surgeon Commander (D) J R Hamsted (Own Request)
Surgeon Lieutenant-Commander W R Davies (Own Request)
Lieutenant D B D Jones (Resignation Accepted)
Surgeon Lieutenant N A Cassim (Commission terminated on entry into R.A.F.)

RELEASED ON TERMINATION OF SHORT SERVICE COMMISSION

Surgeon Lieutenants R N Ridsdill Smith, J M Grinyer, T R Gorild, D K Freebrey, R C H Pollard, H N MacKenzie, T C Taylor, R B Heathcote, H G K Douglas, K I Mackenzie, F Cannon
Surgeon Lieutenant-Commander (D) I M Middlemass

WARDMASTERS

To Wardmaster Lieutenant-Commanders L K Bonn and J Stockton
To Wardmaster Lieutenants R F Fay, G O Jones and G C Hamilton
Promoted to Acting Wardmaster Sub Lieutenant F Brayshaw
Retired (Age) Wardmaster Lieutenant Commanders F W Mitchell and J A F Lihou

QUEEN ALEXANDRA'S ROYAL NAVAL NURSING SERVICE

Promoted to Superintending Sisters Miss H E K Gandon and Miss N K Taylor

ROYAL NAVAL RESERVE

NEW ENTRIES

Surgeon Lieutenants I W M Baxter, M B, Ch B, and R C Clark, M B, B S
Acting Surgeon Sub Lieutenants S L R Oakenfull, J M Musgrave, C P Jardine Brown

RETIREMENTS

Surgeon Captain R. W Crosdaw, V R D (Placed on Retired List)
Surgeon Commander A M McCall (Placed on Retired List)
Surgeon Lieutenant Commander (D) F H Tucker (Resignation Accepted)
Surgeon Lieutenant R W Sharp (Resignation Accepted)

BIRTH ANNOUNCEMENT

LAWRANCE OWEN. On September 26th 1963, at Colchester Military Hospital, to Audrey, wife of Surgeon Lieutenant-Commander J R Lawrance Owen, Royal Navy, of Dedham, a Son.

INDEX

AUTHORS	PAGE
BRAND J J	
Sea sickness	14
CAMERON J A	
A Bath in a Daring Class Destroyer	119
CANNON P	
Cold Immersion	88
CLIFF J M	
Accidental Poisoning with Carbon Tetrachloride	47
COLES, R R A	
Some Considerations Concerning the effects on Hearing of Noise of Small Arms	18
COLES R R A	
The R N Audiometric Trailer Unit	188
COATURN, K R	
The Environment of a Space Capsule	67
CULLEN W	
The Treatment of Depression with Tranylcypromine ('Parnate')	37
CURJEL H E B	
Double Sided Bath for Contrast Bathing	202
DAVIDSON-A F	
Underwater Ejection	17
DURHAM P D A	
An Unusual Problem of Contact Lenses	54
DURHAM P D A	
The Use of the Operation of Medial Rectus Recession in a Series of Fifty Children with Convergent Strabismus Requiring Surgical Correction	127
GASKELL T F	
Man Explores the Sea	222
GOULD T R	
A Review of the High Altitude Selection Test	93
HALL F L	
Alligator Hunt	232
HERON A A	
The R N Audiometric Trailer Unit	188
HESKETH-K T	
Removal of a Broken Kuntschner Nail	208
KNIGHT-J J	
Effect of Jet Aircraft Noise on Hearing	23
KNIGHT J J	
The R N Audiometric Trailer Unit	188
LEWIS, B S	
The Medical Library, R N Hospital, Plymouth	115

	PAGE
LEWIS B S	
A Second Bite at the Cherry	218
MACDONALD-WATSON A	
Eosinophilic Granuloma	44
MACINTYRE I M	
Controlled Clinical Trial with Prothipendyl Hydrochloride ("Tolnate") as a Premedication in Anæsthesia	28
MCNUTT D C	
A Case of Low Blood Pressure	86
MILES S	
Sea-Sickness	14
MILLS WM. J	
A Study of Frostbite Treatment	237
MURRAY YOUNG J	
The Use of "Eskornade" for Royal Naval Aircrew undergoing High Altitude Training	124
NICOL P B	
Heat in Engine Rooms	83
NOBLE, D A	
Thermal Comfort in a Small Warship	176
O'CONNOR A	
Controlled Clinical Trial with Prothipendyl Hydrochloride ("Tolnate") as a Premedication in Anæsthesia	28
OLIVER T P	
A New Medical Centre for H M Dockyard Chatham	161
OSBORN B R	
A Clinical Case of Porcelain Crowns	244
RAWLINS J S P	
Naval Aircraft Underwater Sink Rate Trials	74
SAVIN, L A	
Relationship between Morale and Health in a Ship's Company	33
SAVIN J A	
The Rhythm of Venereal Infection in a Ship's Company	203
SAYERS L B	
Efficacy and Freedom from Side Effects of Slow Release Ferrous Sulphate ("Feospan Spansules")	121
SEGALL M L J	
Efficacy and Freedom from Side Effects of Slow-Release Ferrous Sulphate ("Feospan Spansules")	121
SIEVERS J D	
Eosinophilic Granuloma	44
SWEETMAN L R	
Efficacy and Freedom from Side Effects of Slow-Release Ferrous Sulphate ("Feospan Spansules")	121

	PAGE
TURNBULL T A	
Man Induced Hyperpyrexia	169
TYNER R C	
Efficacy and Freedom from Side Effects of Slow-Release Ferrous Sulphate ("Feospan Spansules")	121
WRIGHT D S	
Two Hundred Cases of Venereal Disease	133
WRIGHT W B	
Ageing in the Royal Navy	2, 102, 195

ARTICLES AND CLINICAL NOTES AND CASES

Ageing in the Royal Navy	2, 102, 195
Alligator Hunt	232
A Second Bite at the Cherry	218
Carbon Tetrachloride, Accidental Poisoning with	47
Contact Lenses: An Unusual Problem of	54
Cold Immersion	88
Controlled Clinical Trial with Prothipendyl Hydrochloride ('Tolnate') as a Premedication in Anaesthesia	28
Daring Class Destroyer, A Bath in	119
Double-Sided Bath for Contrast Bathing	202
Drowning Accidents which occurred in 1961, Analysis of	233
Effects on Hearing of Noise of Small Arms: Some Considerations Concerning the	16
Effect of Jet-Aircraft Noise on Hearing	23
Efficacy and Freedom from Side Effects of Slow Release Ferrous Sulphate ("Feospan Spansules")	121
Eosinophilic Granuloma	44
Eskornade: The Use of for Royal Naval Aircrew Undergoing High Altitude Training	124
Frostbite Treatment: A Study of	237
Heat in Engine Rooms	83
High Altitude Selection Test, A Review of	93
H M Dockyard, Chatham: A New Medical Centre for	161
Hyperpyrexia: Man Induced	169
Kuntschner Nail: Removal of a Broken	208
Low Blood Pressure: A Case of	86
Man Explores the Sea	222
Medical Library, R.N. Hospital, Plymouth	115
Naval Aircraft Underwater Sink Rate Trials	74
Operation of Medial Rectus Recession in a Series of Fifty Children with Convergent Strabismus Requiring Surgical Correction, The Use of the	127
Porcelain Crowns, A Clinical Case of	244
Relationship between Morale and Health in a Ship's Company	33

	PAGE
R.N. Audiometric Trailer Unit, The	188
Royal Naval Hospital, Gibraltar. The Rebirth of the	158
Royal Naval Medical Club Dinner, 1963, The	154
Royal Society of Health Exhibition, Eastbourne, 1963	248
Sea Sickness	14
Space Capsule, The Environment of a	67
Thermal Comfort in a Small Warship	176
The Treatment of Depression with Tranylcypromine ('Parnate')	37
Underwater Ejection	17
Venereal Disease, Two Hundred Cases of	133
Venereal Infection in a Ship's Company, The Rhythm of	203